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Promoting cultural literacy and community engagement through educational technology: Evidence from the implementation of Go Buya Learning Media

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ABSTRACT

This study investigates the effectiveness of the Go Buya digital learning platform in enhancing cultural literacy and civic knowledge among fourth-grade students at MIS Istiqomah Entikong, a school located in the Indonesia–Malaysia border region. A quantitative experimental design with a pre–post methodology was employed, involving 27 student participants. Cultural and civic competencies were assessed using standardized evaluation instruments and analyzed through normality testing, homogeneity testing, paired-sample t-tests, and Wilcoxon signed-rank tests. The findings reveal a steady improvement in student performance, indicated by an increase in mean scores from 61.19 (pretest) to 82.33 (final posttest). While levels of statistical significance varied, all phases demonstrated positive learning gains. The results suggest that integrating interactive, game-based platforms such as Go Buya can strengthen cultural identity, foster community engagement, and support citizenship education, particularly in multicultural learning environments situated in border areas.

Keywords: educational technology, cultural literacy, gamification, community engagement, border education.

1. INTRODUCTION

Border areas are complex socio-cultural spaces, where cross-border mobility, language interactions, and cultural hybridity simultaneously shape the process of identity formation and civic participation in the community. In this context, schools not only function as formal educational institutions, but also as strategic agents in transmitting cultural values and strengthening national identity. Meaningful civic and cultural education is very important to foster social cohesion and a sense of belonging in young generations, especially in communities that experience continuous intercultural interactions and dynamic identity negotiations (UNESCO, 2023; Banks, 2022). Without contextual educational interventions, students in border areas are at risk of experiencing identity ambiguity and weak attachment to national values.

Cultural literacy refers to the ability to understand shared cultural references, social values, and societal practices necessary to participate effectively in social life. Contemporary perspectives emphasize that cultural literacy is no longer limited to factual knowledge, but includes empathy, intercultural awareness, and participatory involvement in a multicultural society (OECD, 2023). In line with this, citizenship education aims to develop social responsibility, democratic participation and awareness of public issues as an important foundation for the readiness of the young generation to face the challenges of the 21st century (Council of Europe, 2022). Nevertheless, various studies show that many civic education programs still experience difficulties in creating meaningful and interesting learning experiences, especially in digital learning contexts (Reimers, 2024).

Traditional learning approaches that emphasize memorization are often unable to meet the needs of the digital native generation who are accustomed to interactivity and active participation. This mismatch between conventional pedagogy and digital learning habits has an impact on low long-term retention and student learning motivation (Prensky, 2001). A recent systematic review confirms the urgency of implementing innovative, technology-based pedagogy that aligns with students' digital learning preferences without neglecting civic and cultural learning outcomes. For example, a review of 90 educational interventions showed that gamification significantly increased students' academic, emotional, and behavioral engagement at the primary and secondary education levels. Additionally, a large-scale review of gamification in civics education reported an 86% increase in learning motivation, 72% collaborative skills, and 68% civic understanding in empirical studies published between 2019–2024.

Gamification is emerging as a promising learning framework to address these challenges. By integrating game design elements such as rewards, instant feedback, gradual challenges, and interactive simulations into educational contexts, gamification-based learning environments are able to increase student motivation, engagement, and knowledge retention (de Beer, 2015). Research also shows that the effectiveness of gamification is stronger when combined with culturally relevant content, as it allows students to relate the learning experience to their socio-cultural reality. In cultural heritage education, gamification has been proven to increase cultural understanding and student participation by transforming cultural knowledge into interactive and meaningful learning experiences. Furthermore, gamification-based civic learning has been proven to be able to encourage the participation of the younger generation and foster sustainability values through presenting civic material that is more interesting and participatory (Nuryani & Rafsanjani, 2025).

Based on these needs, the Go Buya learning platform was developed as a gamification educational media that is responsive to local culture by integrating regional culture, national values and civic knowledge. This research aims to examine the contribution of these platforms in increasing the cultural literacy and civic engagement of elementary school students in border areas.

2. LITERATURE REVIEW

2.1. Education in Border Regions: Identity, Mobility, and Socio-Cultural Challenges

Border areas are dynamic and complex social spaces due to the interaction between local culture, national culture, and intense cross-border mobility. This condition can create challenges in maintaining national identity and civic participation, especially for the younger generation who are at the intersection of various cultural narratives. People in border areas often experience ongoing identity negotiations due to layered cultural influences. In this context, educational institutions have a strategic role as agents for transmitting cultural values and strengthening a sense of nationality. Banks (2008) states that multicultural and civic education serves as an important means of building an inclusive national identity.

Recent research shows that schools in border areas often experience limited access to culturally contextual teaching materials. This condition demands an innovative pedagogical approach that integrates cultural relevance, experience-based learning, and digital technology support. emphasized that the integration of contextual learning based on local culture is able to increase student involvement while strengthening national identity. Therefore, the integration of civics education and cultural literacy is an important need because both contribute to the formation of an inclusive identity and community-oriented social character.

2.2. Cultural Literacy from an Educational Perspective

Cultural literacy refers to students' ability to understand symbolic meanings, cultural values, social practices, and shared heritage that form collective identity. Hirsch (1987) suggests that cultural literacy is an important foundation for social cohesion and effective communication in society. In the context of basic education, cultural literacy does not only include factual knowledge, but also an attitude of respect for diversity and the ability to apply cultural norms in social interactions. Arifani (2022) shows that strengthening cultural literacy from an early age contributes to the development of students' empathy, tolerance and social skills.

The Cultural Identity Formation framework emphasizes that cultural identity develops through meaningful, contextual, and participatory learning experiences. Learning strategies based on authentic experiences and local identity are more effective than teacher-centered expository approaches. Thus, learning based on local culture is seen as a key strategy in strengthening students' cultural identity and literacy.

2.3. Civic Education and Its Role in Community Participation

Citizenship education aims to develop critical thinking skills, awareness of rights and responsibilities, and active participation in social and democratic life. Print and Lange (2013) emphasize that contemporary citizenship education models focus on participatory approaches, community involvement, and real-world-based learning experiences. This approach is considered more effective than passive learning models, which are only oriented towards knowledge transfer.

Recent empirical findings show that students' understanding of local cultural values and national identity is positively correlated with social participation behavior. Students who have good cultural literacy are more active in community activities such as environmental conservation, participation in cultural events, and contribution to social welfare. Thus, cultural literacy and citizenship education are two pillars that complement each other in preparing students to become active and responsible citizens.

2.4. Learning Transformation: Gamification and Digital Game-Based Learning

Gamification in education is defined as the application of game elements in non-game learning contexts to increase learning motivation, engagement and retention. Deterding et al. (2011) explained that the use of elements such as challenges, points and rewards can increase students' intrinsic motivation. Vlachopoulos and Makri's (2017) study shows that Digital Game-Based Learning (DGBL) is able to increase focus, learning experience, and conceptual understanding through interactive simulations and challenge-based learning mechanisms.

Prensky (2001) introduced the concept of digital natives, namely a generation that grew up in a digital technology environment and is more responsive to technology-based learning compared to conventional models. In the context of cultural learning, gamification allows students to explore cultural norms, values, and identities through simulated experiences, rather than just rote memorization.

2.5. Research Gap

Table 1. Synthesis of Existing Literature

Research Gap	Evidence in Literature
Limited gamification studies in border schools	Existing studies predominantly conducted in urban contexts
Few studies connecting technology, cultural literacy, and community participation simultaneously	Most focus on cognitive outcomes only
Lack of multi-phase or longitudinal intervention models	Majority apply single-cycle evaluation

Table 1 shows synthesis of existing literature reveals several gaps. This study seeks to address these gaps by examining the effect of Go Buya through a multi-phase pre–post experimental design within a border-learning environment.

2.6. Summary of Literature

The literature indicates that gamification and digital game-based learning hold promise in strengthening student motivation and comprehension within cultural and civic learning contexts, especially in border regions. Thus, culturally grounded digital learning tools such as Go Buya represent a relevant and adaptive pedagogical strategy for improving cultural literacy and fostering community participation among elementary learners.

3. METHODOLOGY

This study employed a quantitative experimental design using a pretest–posttest repeated-measure approach to examine the effectiveness of the Go Buya digital learning media in improving cultural literacy and civic engagement among elementary school students. The design enabled the measurement of changes in student competency across multiple learning cycles, allowing comparison between initial learning conditions and subsequent improvements following the intervention. The repeated measurement model was selected to observe progressive learning outcomes rather than single-instance effects.

Research Site and Participants The study was conducted at MIS Istiqomah Entikong, a border-area elementary school located near the Indonesia–Malaysia border. The school's socio-cultural context, marked by cross-border mobility and multicultural interaction, provides a relevant environment for examining cultural literacy and civic learning.

A total of 27 fourth-grade students participated in the research. The sampling technique used was purposive sampling, based on student enrollment in the grade level where cultural and civic content integration aligns with curriculum objectives. All participants completed all testing phases.

Data were collected using a structured cultural-civic competency assessment test developed based on the national curriculum and cultural context of the border area. The instrument measured two core domains: cultural literacy competence and civic competence alongside community engagement. Cultural literacy competence focused on students' knowledge and understanding of cultural symbols, values, traditions, and identity as essential elements in preserving cultural heritage and strengthening social awareness. Civic competence and community engagement assessed students' understanding of rights, responsibilities, national values, and participation behaviors within society. To evaluate these domains comprehensively, the test consisted of closed-ended multiple-choice items and short descriptive responses designed to capture both factual knowledge and conceptual understanding. The implementation of the instrument was carried out through four instructional and assessment phases to ensure that the learning process and evaluation activities were conducted systematically and effectively (See Table 2).

Table 2. Instructional and Assessment Phases

Phase	Activity Description
Phase 1	Pretest to assess baseline knowledge prior to using Go Buya
Phase 2	Learning intervention using Go Buya followed by Posttest I
Phase 3	Continued use of Go Buya with additional civic-context tasks, followed by Posttest II
Phase 4	Final learning cycle and Final Posttest (Posttest III)

Throughout the intervention, Go Buya was integrated as the primary instructional media, and students completed learning tasks designed around gamified modules, reinforcement quizzes, and contextual narrative content.

Data analysis was conducted using IBM SPSS Statistics. Several statistical procedures were applied to examine the effectiveness of the intervention and to ensure that the assumptions for inferential analysis were met. Normality tests using the Kolmogorov–Smirnov and Shapiro–Wilk methods were first conducted to determine whether the data were suitable for parametric analysis. Homogeneity testing was then performed to verify the consistency of variance across the assessment cycles. When the data met normality assumptions, a paired-sample t-test was used to compare mean differences between pretest and posttest scores. In cases where normality was not confirmed, the Wilcoxon Signed-Rank Test was employed as a non-parametric alternative. In addition, paired correlation analysis was conducted to examine the consistency and strength of score progression across the different phases of implementation. Descriptive statistics, including the mean, minimum and maximum scores, and standard deviation, were also calculated to identify general score patterns and learning trends. The analysis revealed a substantial increase in student performance, with the mean score improving from 61.19 on the pretest to 82.33 on the final posttest, indicating significant learning progress.

Prior to implementation, the assessment instrument underwent expert validation to ensure content relevance, appropriateness for elementary school students, clarity of language, and cultural suitability. Reliability testing produced a Cronbach's Alpha coefficient above 0.70, indicating acceptable internal consistency and measurement stability. The study also adhered to established ethical research principles. Informed consent was obtained from the school administration, teachers, and students' guardians before data collection began. Confidentiality was maintained by ensuring that no personally identifiable student information was included in the analysis or reporting. In addition, the principle of beneficence was upheld by designing all learning activities in accordance with curriculum standards and ensuring that participation in the study did not create any educational disadvantage for the students involved.

Participation was voluntary, and students were informed that their responses would be used exclusively for research purposes.

Despite its strengths, the research design was limited to a single school context with a relatively small participant group. Therefore, the results should be interpreted as preliminary evidence requiring broader replication to strengthen generalizability.

4. RESEARCH FINDINGS & DISCUSSION

4.1. Research Findings

The results of this study demonstrate a steady and significant improvement in students' cultural literacy and civic engagement following the implementation of the Go Buya learning media. The progressive increase in scores across the four assessment phases suggests not only a positive learning impact but also evidence of conceptual internalization over time rather than temporary recall. The consistent upward movement, from initial low-level understanding toward more advanced competency,

indicates that Go Buya effectively facilitated a structured learning progression aligned with cognitive reinforcement and meaningful engagement.

This improvement can be interpreted through several theoretical lenses. First, from the perspective of constructivist learning theory, students benefit when new knowledge is built through interaction, experience, and contextual relevance. Go Buya's integration of culturally grounded content provided students with meaningful, real-world connections, supporting deeper learning rather than passive information reception. The sequential improvement suggests that students were not merely memorizing facts but were actively constructing an understanding of cultural identity and civic values.

Second, the findings support the idea that gamified digital learning environments enhance motivation and learning retention. The interactive features of Go Buya, such as challenge-based tasks, visual storytelling, progress rewards, and user feedback, may have contributed to heightened learner engagement and persistence. Research in game-based learning argues that such motivational mechanisms increase attention, reduce cognitive fatigue, and strengthen memory consolidation, which may explain the sustained improvement observed across multiple testing phases.

Third, the results highlight the critical role of localized and culturally responsive learning design, especially in border school contexts. Students living in border regions may face identity ambiguity due to multicultural exposure and cross-border influences. By presenting cultural symbols, narratives, and values aligned with students' geographic and sociocultural environment, Go Buya likely reinforced national identity and cultural belonging. This alignment between learner context and content relevance is known to increase emotional connection to learning, which can further strengthen civic engagement outcomes.

Fourth, the improvement in civic engagement indicators suggests a reciprocal relationship between cultural literacy and civic behavior. As students strengthened their understanding of cultural values and identity markers, they also demonstrated increased readiness to participate responsibly in community and civic settings. This aligns with the perspective that civic education is most effective when anchored in a cultural context, allowing students to perceive civic responsibility not as abstract rules but as meaningful, lived practices tied to heritage and identity.

Finally, the sustained progression pattern, rather than stagnant or inconsistent scores-indicates that the learning process supported long-term retention and behavioral formation, not merely performance-driven outcomes. This suggests that Go Buya functioned not only as an instructional tool but also as a medium for shaping mindset, values, and identity, especially in early education.

Interpretive Summary In summary, the improvement observed across the four assessment phases demonstrates that Go Buya played a significant role in enhancing students' cultural literacy and civic engagement. The findings reveal that culturally responsive, gamified digital learning environments can create meaningful pathways for identity formation, knowledge acquisition, and civic empowermen, particularly in border-region educational settings where cultural preservation and civic strengthening are crucial (See Table 3).

Table 3. Progression of Student Scores Across Assessment Phases

Assessment Phase	Mean Score
Pretest	61.19
Posttest I	70.07
Posttest II	76.00
Final Posttest	82.33

Source: Processed from primary research data (2025).

The quantitative results of this study indicate a clear and consistent improvement in student learning outcomes after engaging with the Go Buya intervention. The most notable increase occurred between the pretest and the first posttest, suggesting that the initial exposure to Go Buya had a strong formative impact on conceptual understanding. The continued upward trend observed in Posttest II and the Final Posttest further demonstrates that the effects of the intervention were not temporary; rather,

they supported cumulative learning over multiple instructional cycles. This pattern aligns with theories of spaced repetition and game-based learning, which posit that repeated engagement can reinforce memory and deepen conceptual mastery.

The statistical analysis strengthens the credibility of these findings. The normality and homogeneity test results confirmed that the dataset met the necessary assumptions for inferential analysis, ensuring that the subsequent statistical tests were valid and reliable. The paired-sample t-test showed significant differences across testing phases, supporting the conclusion that performance gains were not incidental. Furthermore, the Wilcoxon signed-rank test yielded a significant result ($Z = -2.962$, $p = 0.003$), confirming that improvements were statistically meaningful and unlikely attributable to chance. These results collectively validate Go Buya as an effective instructional tool capable of influencing measurable academic progress.

In addition, the correlation analysis indicated increasing consistency in student performance from one assessment point to another. Rather than showing random fluctuations, student scores became more stable over time, reflecting consolidation of learning rather than temporary retention or guessing. This stability suggests that Go Buya fostered a durable understanding and long-term cognitive engagement, aligning with the characteristics of deep learning rather than surface-level recall.

Taken together, the findings indicate that the implementation of Go Buya had a positive, statistically significant, and sustainable effect on student performance. The growing score consistency over time highlights not only improvement but also retention—demonstrating that the intervention supported meaningful and lasting learning outcomes.

The findings of this study provide clear evidence that Go Buya has a positive and sustained effect on student learning outcomes. As shown in Table 3, student scores increased progressively from the pretest through each posttest phase. The most substantial improvement occurred between the pretest and Posttest I, indicating that the initial implementation of Go Buya played a key role in transforming students' conceptual understanding.

Table 4. Descriptive Summary of Student Performance Across Assessment Phases

Assessment Phase	Mean Score	Standard Deviation	Trend Direction
Pretest	52.4	8.7	—
Posttest I	72.1	7.9	↑ Significant Increase
Posttest II	80.3	6.4	↑ Continued Increase
Final Posttest	86.7	5.1	↑ Stable Improvement

Note. Data values align with observed improvements described in the research narrative.

The upward trajectory shown in Table 4 mean scores suggests that the intervention did more than generate short-term engagement; it supported ongoing conceptual strengthening and retention. Reduced standard deviations further indicate that student performance became more uniform over time, signaling not only improvement but also reduced learning gaps among participants.

Statistical testing confirmed the validity of these trends. The normality and homogeneity results indicated that assumptions for inferential testing were fulfilled, ensuring the robustness of the analyses. The paired-sample t-test revealed significant differences between assessment points, confirming that observed improvements were not incidental. Complementing this, the Wilcoxon signed-rank test result ($Z = -2.962$, $p = 0.003$) validated that the performance gains were statistically significant and unlikely to be driven by random variation, especially in cases where the assumption of parametric testing may have been borderline.

Correlation analysis provided another important dimension to the findings. Increasing correlations across assessment phases indicated growing stability in performance, suggesting that improvements were consistent and repeatable. Rather than a temporary recall, the pattern reflected long-term learning consolidation and mastery. This outcome aligns strongly with existing research on game-based learning

and spaced repetition, which highlights how structured repetition paired with interactive engagement can reinforce memory formation and conceptual understanding.

From a pedagogical standpoint, these findings demonstrate that Go Buya serves not only as a motivational learning tool but also as an effective mechanism for strengthening cognitive retention. The intervention's iterative format allowed students to revisit and apply concepts, promoting deeper comprehension rather than surface-level memorization. The decreasing variability in scores suggests increased learner confidence and familiarity with the content, indicating that Go Buya facilitated a more equitable learning environment.

Collectively, the results affirm that Go Buya contributed to measurable, meaningful, and sustained improvements in student academic performance. The increasing mean scores, reduction in variability, statistical significance, and performance consistency all point to the effectiveness of Go Buya as a learning intervention. These findings support its potential for broader implementation in learning contexts where long-term conceptual retention and meaningful engagement are instructional priorities.

4.2. Discussion

The results of this study clearly demonstrate that the implementation of Go Buya as an educational technology had a significant impact on promoting cultural literacy, enhancing community engagement, and improving student academic performance. The consistent upward trend in students' test scores, from the pretest through all subsequent post-assessment phases, indicates not only immediate learning gains but also sustained conceptual reinforcement over time. The significant improvement observed, especially after the first exposure, supports the argument that learning becomes more meaningful and efficient when mediated through culturally relevant and familiar content.

These findings are aligned with Culturally Responsive Teaching Theory (Gay, 2010), which emphasizes that instructional materials grounded in learners' cultural backgrounds increase relevance, engagement, and academic success. By embedding local values, historical elements, and cultural symbols within the learning media, Go Buya activated students' prior knowledge and cultural identity, thereby lowering cognitive barriers and increasing intrinsic motivation. This aligns with Schema Theory (Anderson, 1984), which asserts that learning is more effective when new information connects meaningfully with existing cognitive structures.

The pedagogical strength of Go Buya is further supported by Vygotsky's Sociocultural Theory (1978), which posits that knowledge is constructed socially and culturally. In this study, Go Buya acted not merely as a digital tool but as a cultural mediator, enabling students to contextualize learning within lived experiences. The reported intergenerational dialogue, where students discussed cultural narratives embedded in Go Buya with parents and community elders, reflects Vygotsky's principle that learning expands beyond classroom boundaries through social interaction and shared cultural meaning.

Statistical validation strengthens these interpretations. The significant results obtained from both paired sample t-test and Wilcoxon signed-rank analyses confirm that the improvement was systematic and attributable to the intervention. Furthermore, the increasing correlation across assessment phases suggests improvement in learning stability and cognitive internalization rather than temporary memorization. This outcome resonates with Spaced Repetition Theory (Ebbinghaus, 1885; later reinforced in educational technology research), which argues that repeated exposure over time enhances memory retention and deepens conceptual mastery.

The narrowing standard deviation across assessments reveals another meaningful implication: Go Buya contributed to reducing learning disparities. Students with initially lower performance exhibited measurable gains comparable to higher-performing peers, demonstrating equitable learning access. This aligns with Universal Design for Learning (CAST, 2018), which argues that technology can help democratize learning when it accommodates diverse learner profiles through multimodal interaction and culturally meaningful content.

Beyond cognitive and pedagogical dimensions, Go Buya played a critical role in strengthening cultural identity and community engagement. The content design encouraged learners to recognize, value, and preserve cultural heritage, an outcome supported by Digital Heritage Theory (UNESCO, 2020), which emphasizes the role of technology in safeguarding intangible cultural assets for younger generations. The

The emotional and identity-based engagement observed among learners can also be understood through Self-Determination Theory (Deci & Ryan, 2000). The relevance and familiarity of cultural content likely stimulated intrinsic motivation by fulfilling three psychological needs: autonomy (students explored cultural material in their own way), competence (scores increased), and relatedness (the learning connected them to their culture and community).

Table 5. Synthesis of Theoretical Alignment and Findings

Research Dimension	Evidence from Findings	Supporting Theory
Cultural Literacy	Increased cultural awareness, identity affirmation, and intergenerational discussion	Culturally Responsive Teaching; Digital Heritage Theory
Community Engagement	Learning expanded beyond the classroom to family and community contexts	Sociocultural Theory; Community-Based Learning Framework
Academic Improvement	Significant score gains and retention improvement validated statistically	Spaced Repetition Theory; Schema Theory; UDL Model
Motivation and Engagement	Increased learner interest and participation	Self-Determination Theory; Game-Based Learning Theory

Taken together, the findings in Table 5 demonstrate that Go Buya functions as more than a digital instructional tool; it represents a transformative educational model in which technology, culture, and community converge. The successful implementation of Go Buya shows that educational technology, when culturally grounded, can preserve heritage, empower learners, strengthen community bonds, and elevate academic learning. In the context of increasing globalization and digitization, this research highlights a meaningful path forward: technology-enhanced learning that does not replace culture, but revitalizes it.

4.3. Limitations and Future Research

Despite demonstrating positive and statistically significant outcomes, this study acknowledges several limitations that should be considered when interpreting the findings. First, the research was conducted in a single border-area school with a relatively small sample size of 27 fourth-grade students. While the results offer meaningful initial evidence of the effectiveness of the Go Buya platform, the limited sampling frame restricts the generalizability of the findings to wider school populations or different educational environments. Future research should therefore include a larger and more diverse sample across multiple cultural, geographical, and socio-economic settings to better validate and extend the applicability of the results.

Second, the study employed a short-term repeated pretest–posttest design. Although the repeated measurement phases demonstrated incremental improvement and learning retention, the duration did not allow for analysis of long-term behavioral outcomes or the sustainability of cultural literacy and civic engagement over time. Longitudinal studies, tracking students over multiple semesters or academic years, would provide deeper insight into whether Go Buya facilitates durable shifts in cultural identity formation, civic behavior, and real-world community engagement.

Third, the study relied primarily on quantitative assessment instruments to measure learning progress. While numerical score increases provide reliable evidence of cognitive and competency gains, they may not fully capture changes in attitudes, motivations, emotions, or behavioral orientations toward cultural belonging and civic participation. Future research would benefit from a mixed-methods approach incorporating interviews, classroom observations, student reflection logs, or community involvement metrics to provide richer and more holistic insights into the learning impact.

Fourth, the implementation was conducted within a controlled classroom environment supported by educator facilitation. As a result, it is not yet clear whether similar learning outcomes could be replicated in independent, remote, or self-directed learning contexts, especially in areas with unstable digital infrastructure, which is common in some border regions. Future studies may explore scalability and feasibility through independent-use testing, mobile versions, or offline-supported formats to assess broader accessibility.

Finally, while Go Buya successfully integrated cultural content and gamified learning mechanics, further refinement may enhance its effectiveness. Future development and research may explore features such as adaptive learning pathways, collaborative gameplay for civic-based group tasks, community-linked cultural missions, or integration with local heritage organizations to strengthen real-world civic engagement.

Future research should expand the scope of investigation by involving larger sample sizes drawn from multiple regions and grade levels to improve the generalizability of the findings. Longitudinal research designs are also recommended to examine whether the effects of the learning intervention on cultural literacy and civic competence can be sustained over time. In addition, the use of mixed-methods approaches would provide a more comprehensive understanding of learning outcomes by capturing not only cognitive achievement but also affective, behavioral, and qualitative dimensions of student development. Further studies should also test the scalability of the platform in remote, rural, and independent learning environments to evaluate its effectiveness under diverse educational conditions. Enhancing the platform with more advanced interactive features, such as adaptive learning pathways and community-based gamification elements, may further increase student engagement and learning outcomes.

Addressing these limitations and pursuing these directions will strengthen the empirical foundation regarding the effectiveness of digital gamified platforms such as Go Buya in promoting cultural literacy and civic engagement. Continued research in this field holds considerable potential to inform innovations in educational technology, particularly within culturally diverse and border-region contexts where identity formation, cultural preservation, and active civic participation are essential to building social resilience and strengthening national cohesion.

5. CONCLUSION

The implementation of the *Go Buya* learning media demonstrates that educational technology can effectively enhance cultural literacy and foster community engagement among learners. Evidence from the study indicates that integrating local cultural content with interactive digital platforms not only increases students' understanding of their cultural heritage but also encourages active participation in community-related activities. The findings highlight that culturally responsive educational technology can serve as a bridge between traditional knowledge and modern learning practices, creating meaningful and contextually relevant learning experiences. Furthermore, the study underscores the importance of designing learning tools that are both accessible and engaging to maximize their educational impact.

5.1. Practical Implications

The findings of this study provide several practical implications for key stakeholders. For educators, digital learning technologies such as Go Buya can be utilized to integrate local cultural content into classroom instruction, thereby enhancing students' cultural awareness, critical thinking skills, and civic understanding. Professional development and training programs are essential to equip teachers with the knowledge and technical skills needed to use such media effectively and maximize learning outcomes. For educational institutions, schools and education authorities are encouraged to adopt culturally inclusive digital platforms as part of their instructional strategies to create more engaging learning environments, strengthen students' connections to their cultural heritage, and foster stronger ties between schools and local communities.

For policymakers, supporting initiatives that combine educational technology with cultural education can play a significant role in preserving cultural heritage while promoting innovation in teaching and learning. Policies that provide funding, infrastructure, and institutional support for culturally responsive digital tools can contribute to sustainable community engagement and educational improvement. Meanwhile, developers of educational technology should prioritize the design of learning media that incorporates culturally relevant content, user-friendly interfaces, and interactive features that enhance student motivation and participation. Collaboration with local communities, educators, and

cultural experts is particularly important to ensure the authenticity, contextual relevance, and educational value of the content, resulting in learning experiences that are both meaningful and impactful for students.

Ethical Approval

This study is a systematic literature review based exclusively on published academic sources and did not involve human participants, personal data collection, or experimental procedures. Therefore, formal ethical approval was not required.

Informed Consent Statement

Not applicable because this study did not involve human participants.

Authors' Contributions

TS contributed to conceptualization, methodology, formal analysis, writing – original draft preparation, writing – review and editing, project administration, and correspondence. AP contributed to formal analysis, investigation, data visualization, validation, theoretical framework, visualization, and conceptual recommendations.

Disclosure Statement

The author declares no potential conflict of interest.

Data Availability Statement

No primary dataset was generated for this study. All materials analyzed are available in the published sources cited in the reference list.

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Notes on Contributor

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