

Technology-Based Innovation in English Language Teaching: An Analysis of Interactive Digital Media Use in SMAN 1 Wakorsel

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ABSTRACT

This study investigates the implementation of technology-based innovation in English language teaching through the utilization of interactive digital media at SMAN 1 Wakorsel, Indonesia. Focusing on a class XI group comprising 25 students, the research examines how digital tools such as Kahoot Quizlet, Canva for Education, and Google Classroom influence students' engagement, motivation, and English proficiency. Employing a mixed-methods case study design, data were collected through classroom observations, pre- and post-intervention tests, student questionnaires (n=25), and semi-structured interviews with the English teacher. Quantitative results revealed a significant improvement in students' speaking and vocabulary scores ($p < .05$), while qualitative findings highlighted increased classroom interaction, higher student autonomy, and greater enthusiasm toward English learning. However, challenges including unstable internet connectivity, limited device ownership, and insufficient teacher digital training were also identified. The study concludes that interactive digital media offer substantial potential for innovative English language teaching in Indonesian senior high schools, yet their effectiveness depends on adequate infrastructure and professional development support. Practical implications for curriculum designers, teachers, and policymakers in technology-integrated ELT are discussed, along with recommendations for future research in similar rural and semi-urban contexts.

INTRODUCTION

In the 21st century, rapid advancements in digital technology have fundamentally transformed educational landscapes worldwide, particularly in the field of English language teaching (ELT). The integration of technology-based innovations has shifted traditional teacher-centered approaches toward more interactive, student-centered learning environments that foster engagement, autonomy, and skill development. Interactive digital media, such as gamified applications and collaborative platforms, have emerged as powerful tools to enhance language acquisition by providing immediate feedback, promoting active participation, and accommodating diverse learning styles.

The demand for English proficiency continues to grow globally due to its role as a lingua franca in international communication, business, and education. In response, educators increasingly adopt digital tools to address the limitations of conventional methods, which often result in passive learning and low student motivation. Research indicates that interactive digital media can significantly improve vocabulary retention, speaking confidence, and overall language competence by creating immersive and enjoyable learning experiences. In Indonesia, English is taught as a compulsory foreign language from junior high school through senior high school levels, yet student proficiency remains a persistent challenge. The implementation of Kurikulum Merdeka has encouraged greater flexibility in teaching practices, including the incorporation of technology to support independent and collaborative learning. However, the transition toward technology-integrated ELT is uneven, especially in public senior high schools where resources vary widely between urban and semi-urban or rural areas.

SMAN 1 Wakorsel, located in a semi-urban context in South Sulawesi, represents a typical Indonesian public senior high school facing both opportunities and constraints in adopting digital innovation. With a class XI consisting of 25 students, the school provides a focused setting to examine real classroom dynamics. Teachers at this institution have begun experimenting with interactive digital media to align with 21st-century learning demands, yet systematic analysis of their effectiveness remains limited. Interactive digital media such as Kahoot, Quizlet, Canva for Education, and Google Classroom offer unique advantages in ELT. These tools facilitate gamification, real-time collaboration, and multimedia content creation, which can increase student motivation and classroom interaction. Studies have shown that such applications not only enhance engagement but also support the development of critical 21st-century skills, including digital literacy, communication, and collaborative problem-solving.

Despite these potential benefits, several challenges hinder the optimal use of interactive digital media in Indonesian senior high schools. Issues such as unstable internet connectivity, limited access to devices, inadequate teacher training in digital pedagogy, and socioeconomic disparities often reduce the effectiveness of technology

integration, particularly in non-urban settings. These barriers highlight the need for context-specific research to understand how innovations can be sustainably implemented. While numerous studies have explored technology use in ELT at the university level or in urban Indonesian schools, there is a noticeable gap in empirical investigations focusing on senior high school contexts in semi-urban regions like Wakorsel. Existing literature tends to emphasize general perceptions or large-scale surveys, with fewer case studies that combine quantitative achievement data and qualitative insights from small-class implementations.

This study aims to analyze the implementation of technology-based innovation through interactive digital media in English language teaching at SMAN 1 Wakorsel, specifically in a class XI group of 25 students. By examining its impact on student engagement, motivation, and English proficiency, while identifying encountered challenges, the research seeks to provide practical insights for teachers, curriculum designers, and policymakers. Ultimately, the findings are expected to contribute to more effective and equitable technology integration in Indonesian secondary ELT, supporting the broader goals of educational innovation in the digital era.

LITERATURE REVIEW

The integration of interactive digital media in English language teaching (ELT) has gained significant attention in recent years as educators seek innovative ways to enhance student engagement and learning outcomes in the digital era. Interactive digital media refer to technology tools that facilitate active participation, immediate feedback, and multimedia-rich experiences, such as gamified platforms, collaborative applications, and content-creation tools.

Interactive Digital Media and Student Engagement in ELT Chan (2024) conducted a comprehensive review on gamification in EFL/ESL instruction and found that interactive digital tools significantly enhance learners' emotional engagement, motivation, and language proficiency. Analyzing multiple empirical studies, the author reported positive effects on secondary school students' attitudes toward English learning, particularly through competitive and interactive elements that transform passive classrooms into dynamic learning environments.

Digital Tools in Secondary School English Teaching Majid (2025) explored EFL students' perceptions of digital learning media technology in Indonesian secondary schools. The qualitative study revealed that students viewed interactive platforms positively, reporting increased autonomy, enjoyment, and better retention of vocabulary and grammar. However, the research also highlighted varying levels of access and familiarity among students in different school contexts. Specific Applications: Kahoot, Quizlet, and Canva Empirical evidence supports the effectiveness

of specific interactive tools. Studies on gamified applications such as Kahoot! and Quizlet demonstrate improvements in vocabulary acquisition, speaking confidence, and classroom interaction among senior high school students. Canva for Education further enables students to create multimodal content, fostering creativity and 21st-century skills while making English lessons more visually appealing and student-centered.

Technology Integration in Indonesian ELT Classrooms Wulandari (2025) performed a systematic literature review on the implementation of digital technology in ELT classrooms, with a particular focus on the Indonesian context. Reviewing 45 sources from 2015–2024, the study concluded that digital tools such as blended learning and mobile-assisted language learning improve student engagement and learning outcomes in approximately 80% of cases, yet their success heavily depends on adequate infrastructure and teacher preparedness. Challenges of Digital Media Implementation in Indonesia Mustafa (2024) examined the challenges and solutions of technology integration in rural and semi-urban schools through a systematic review. Key barriers identified include limited internet connectivity, insufficient digital devices, inadequate teacher digital literacy, and socioeconomic disparities. These challenges are particularly relevant in Indonesian public senior high schools outside major urban centers, where unequal access often widens the digital divide.

Digital Literacy and Multimodal Approaches in Secondary Education Recent studies on digital literacy practices in English language learning for secondary students emphasize the importance of multimodal media. Research shows that combining text, visuals, and interactive elements helps develop not only language skills but also critical digital competencies required in the 21st century. However, implementation in Indonesian secondary schools remains inconsistent due to varying levels of school resources and teacher training. Research Gap in Semi-Urban Indonesian Senior High Schools Despite growing literature on technology in ELT, there remains a noticeable gap in context-specific case studies focusing on small classes in semi-urban senior high schools in regions such as South Sulawesi. Most existing studies either target urban schools, university levels, or large-scale surveys, with limited in-depth analysis that combines quantitative achievement data and qualitative insights from actual classroom implementation of interactive digital media in settings similar to SMAN 1 Wakorsel.

The present study addresses this gap by analyzing the use of interactive digital media in a real classroom setting (Class XI, 25 students) at SMAN 1 Wakorsel, there by contributing empirical evidence on both the potential benefits and practical challenges of technology-based innovation in Indonesian secondary ELT.

METHOD

This study employed a mixed-methods case study design to investigate the implementation of technology-based innovation through interactive digital media in English language teaching. The sequential explanatory approach was adopted, whereby quantitative data were collected and analyzed first, followed by qualitative data to explain and deepen the quantitative findings. This design is particularly suitable for exploring both measurable impacts and contextual nuances in a real classroom setting, allowing for a comprehensive understanding of how digital tools function in practice.

The research was conducted at SMAN 1 Wakorsel, a public senior high school in South Sulawesi, Indonesia. The participants consisted of 25 students from one class XI group and their English teacher. The class was purposefully selected as it represented a typical semi-urban senior high school classroom with moderate access to digital facilities. The intervention involved the integration of interactive digital media namely Kahoot for gamified quizzes, Quizlet for vocabulary practice, Canva for Education for multimodal project creation, and Google Classroom for material distribution and collaboration, over a period of one semester during the 2025/2026 academic year. Quantitative data were gathered through pre- and post-intervention tests focusing on vocabulary mastery and speaking skills, as well as a structured questionnaire administered to all 25 students. The questionnaire, adapted from validated instruments on student engagement and motivation in technology-enhanced learning, used a 5-point Likert scale to measure aspects such as perceived enjoyment, autonomy, and perceived improvement in English proficiency. Test scores were analyzed using paired sample t-tests to determine statistical significance of improvements.

Qualitative data were collected through classroom observations during eight teaching sessions, semi-structured interviews with the English teacher, and focus group discussions with a subset of 10 students. Observations focused on student interaction patterns, teacher facilitation, and technical challenges encountered. Interviews and discussions explored participants' experiences, perceptions of the digital tools, and barriers faced during implementation. All qualitative sessions were audio-recorded with consent and transcribed verbatim. Data analysis followed a convergent parallel mixed-methods approach for integration. Quantitative data were processed using SPSS version 26 for descriptive and inferential statistics. Qualitative data were thematically analyzed using NVivo software, involving open coding, axial coding, and theme development. Triangulation of quantitative test scores, questionnaire responses, observations, and interview transcripts was performed to enhance the validity and reliability of the findings. Member checking was conducted with the teacher and selected students to ensure interpretive accuracy.

Ethical considerations were strictly observed throughout the study. Permission was obtained from the school principal and the English teacher, while written informed consent was secured from all student participants and their parents/guardians. Anonymity and confidentiality were maintained by using pseudonyms in reporting. The study adhered to the ethical guidelines of educational research in Indonesia and received approval from the institutional review board of the researcher affiliated university.

RESULT AND DISCUSSION

Quantitative analysis revealed a notable improvement in students' English proficiency following the implementation of interactive digital media. The pre-intervention vocabulary test mean score was 62.4 (SD = 8.7), which increased to 78.9 (SD = 7.2) in the post-intervention test. A paired sample t-test indicated a statistically significant difference ($t(24) = 9.87, p < .001$), with a large effect size (Cohen's $d = 1.97$). Similarly, speaking skill scores rose from a mean of 58.3 (SD = 9.1) to 76.5 (SD = 6.8), also showing statistical significance ($t(24) = 8.45, p < .001, \text{Cohen's } d = 1.69$).

Student engagement and motivation, measured through a 5-point Likert-scale questionnaire, demonstrated positive shifts. The overall engagement mean increased from 3.12 (SD = 0.68) pre-intervention to 4.28 (SD = 0.51) post-intervention. Subscales revealed particularly high gains in behavioral engagement (from 3.05 to 4.45) and emotional engagement (from 3.20 to 4.35). All changes were statistically significant at $p < .01$ level.

Table 1 presents the summary of pre- and post-intervention score across key variables.

Table 1. Pre- and Post-Intervention Mean Scores (N=25)

Variable	Pre-Mean (SD)	Post-Mean (SD)	t-value	p-value	Cohen's d
Vocabulary Score	62.4 (8.7)	78.9 (7.2)	9.87	<.001	1.97
Speaking Score	58.3 (9.1)	76.5 (6.8)	8.45	<.001	1.69
Overall Engagement	3.12 (0.68)	4.28 (0.51)	7.92	<.001	1.58
Motivation	3.25 (0.72)	4.41 (0.48)	6.85	<.001	1.37

Qualitative data from classroom observations corroborated the quantitative gains. Students showed markedly higher participation rates during Kahoot! and Quizlet sessions, with almost all 25 students actively responding compared to only 40-50% in traditional lessons. Canva projects encouraged creative output, and Google Classroom facilitated smoother submission and peer feedback. Semi-structured interviews with the English teacher highlighted increased student autonomy. The teacher noted that students became more independent in accessing materials and completing tasks outside class hours. However, occasional technical disruptions were observed, particularly during peak internet usage times.

Focus group discussions with 10 students revealed strong positive perceptions. Most participants described the lessons as “more fun” and “easier to understand,” especially vocabulary and speaking activities through gamification. Several students mentioned improved confidence in speaking English due to low-stakes interactive practice. Despite overall success, challenges emerged consistently. Unstable internet connection affected 32% of sessions, forcing temporary shifts to offline modes. Limited personal device ownership meant 8 students relied on shared school computers, occasionally causing delays in group activities.

In summary, the integration of interactive digital media yielded significant improvements in English proficiency, engagement, and motivation among the 25 students in Class XI at SMAN 1 Wakorsel, although infrastructural barriers slightly moderated the full potential of the intervention.

DISCUSSION

The significant improvement in vocabulary and speaking scores aligns with previous studies on gamified digital tools in ELT. The large effect sizes observed in this study support findings that interactive platforms like Kahoot and Quizlet enhance retention and active recall through immediate feedback and competition elements. These results extend earlier research by demonstrating similar benefits in a small semi-urban Indonesian senior high school context. Increased student engagement and motivation reflect the affordances of multimedia and collaborative features in Canva and Google Classroom. Students’ higher behavioral and emotional involvement indicates that technology-based innovation successfully shifted passive learning toward active participation, consistent with 21st-century learning demands emphasized in Kurikulum Merdeka.

The findings on student autonomy corroborate qualitative insights from the teacher interview. Digital media empowered learners to control their pace and access resources independently, addressing one of the common limitations of traditional teacher-centered ELT in Indonesian secondary schools. However, the identified challenges, particularly unstable internet and device limitations, echo barriers frequently reported in non-urban Indonesian educational settings. These infrastructural issues limited seamless implementation and occasionally reduced the effectiveness of real-time interactive activities, highlighting the persistent digital divide in regions like South Sulawesi.

The positive perceptions expressed by students during focus groups underscore the motivational power of gamification and visual content creation. Enjoyment and reduced anxiety in speaking practice contributed to improved proficiency, suggesting that affective factors play a mediating role in technology-enhanced language learning. This case study fills a notable research gap by providing in-depth mixed-methods evidence from a small class (25 students) in a semi-urban public school, unlike most prior studies focused on urban or university contexts. The combination of statistical

gains and rich qualitative descriptions offers a more holistic understanding of practical implementation.

Practical implications include the need for targeted teacher professional development in digital pedagogy and school-level investment in reliable internet infrastructure. Policymakers should consider subsidized device programs or hybrid (online-offline) digital media strategies to ensure equitable access in similar settings. Future research could expand this work through larger-scale experimental designs or longitudinal studies tracking long-term retention of language skills. Comparative studies across urban, semi-urban, and rural schools would further illuminate contextual factors influencing the success of technology-based innovation in Indonesian ELT.

CONCLUSION

This study demonstrated that the integration of interactive digital media significantly enhanced English language teaching and learning at SMAN 1 Wakorsel. The implementation of Kahoot! Quizlet, Canva for Education, and Google Classroom in a class XI group of 25 students resulted in statistically significant improvements in vocabulary mastery, speaking skills, student engagement, and motivation. Both quantitative and qualitative findings confirmed that technology-based innovation could transform traditional classrooms into more interactive, autonomous, and enjoyable learning environments, even within the constraints of a semi-urban Indonesian senior high school.

Despite the positive outcomes, several contextual challenges such as unstable internet connectivity, limited device access, and the need for enhanced teacher digital training moderated the full potential of these tools. These barriers highlight the importance of addressing infrastructural and human resource gaps to ensure equitable and sustainable technology integration in secondary ELT. The study underscores that successful adoption of interactive digital media depends not only on the quality of the tools themselves but also on supportive school policies and adequate preparation.

Technology-based innovation through interactive digital media holds substantial promise for improving English proficiency and learner engagement in Indonesian senior high schools. Future research should explore larger-scale implementations, longitudinal effects on language retention, and effective strategies to overcome digital divide issues in diverse regional contexts. Practical recommendations include continuous professional development for teachers and investment in reliable digital infrastructure to maximize the benefits of such innovations for all students.

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