JETAL: JOURNAL OF ENGLISH TEACHING & APPLIED LINGUISTICS

VOLUME (8) Number (1) Page (151-162) E-ISSN: 2714-9811

DIGITAL TECHNOLOGY AND GAME-BASED LEARNING: PRE–POST CHANGES IN ENGLISH PROFICIENCY, MOTIVATION, AND ENGAGEMENT AMONG INDONESIAN HIGH SCHOOL EFL STUDENTS

Syafaruddin Marpaung
SMA Negeri 2 Kota Tanjungbalai, North Sumatra, Indonesia
Email: syafaruddinmarpaung91@guru.sma.belajar.id

ABSTRACT

Research on digital game-based EFL learning often examines language achievement or engagement separately, leaving limited evidence about how proficiency, motivation, and engagement change together in secondary classrooms. This study examined pre–post changes associated with curriculum-aligned digital and game-based learning among 60 Grade XI students aged 16–17 years. A mixed-methods pre-experimental one-group pre-test–post-test design was used during an eight-week, 16-session intervention integrating Quizizz, Kahoot!, Wordwall, and locally adapted educational games. Data included proficiency tests, motivation and engagement questionnaires, classroom observations, semi-structured interviews, and platform analytics. Mean English proficiency increased from 64.18 to 76.52, $t(59) = 11.27$, $p < .001$, $d = 1.46$; motivation and engagement increased from 3.14 to 4.02, $t(59) = 11.93$, $p < .001$, $d = 1.54$. Qualitative findings indicated greater enjoyment, lower learning anxiety, stronger peer interaction, and increased awareness of errors through immediate feedback. Given the absence of a comparison group, these findings indicate substantial pre–post gains rather than causal effects. The study contributes an explanatory classroom mechanism in which curriculum alignment, feedback, repeated practice, interaction, and teacher mediation jointly support engagement and language practice.

Keywords: *digital technology; EFL learning; engagement; game-based learning; language proficiency; motivation*

Introduction

The rapid expansion of digital technology has substantially reshaped English as a Foreign Language (EFL) education. Language learning is no longer confined to textbooks, teacher explanations, or the physical classroom; learners increasingly encounter English through digital platforms, mobile applications, multimedia resources, online communities, and game-mediated environments. This shift has encouraged more interactive and learner-responsive forms of instruction and has blurred the boundaries between formal classroom learning and out-of-class language experiences. Lai and Sundqvist (2026) emphasize the need to connect technology-mediated learning across these settings, while systematic reviews document the growing role of mobile and digital tools in language education (Ishaq et al., 2021; Liu et al., 2023). Digital gaming research likewise highlights interaction, feedback, authentic language use, and learner agency as potentially valuable features for language learning (Reinhardt & Bain, 2026). For secondary EFL learners, these developments are especially relevant because adolescents already participate extensively in digitally mediated environments that can be connected purposefully to classroom goals.

In Indonesia, however, the pedagogical potential of digital environments must be understood within an EFL context where English exposure outside school is often limited. Indonesian and local languages dominate everyday communication, leaving many learners dependent on formal instruction for sustained English input and practice (Rakhmannia, 2022). Extramural exposure can support language development, yet opportunities differ substantially among learners (Oei et al., 2024). Secondary students may consequently struggle not only with linguistic competence but also with confidence, participation, and motivation. At the same time, digital media are increasingly embedded in students' daily lives, creating a

paradox: access to technology may expand while access to pedagogically meaningful English practice remains uneven. Indonesian studies have reported positive responses to game-based and digital learning activities, but their effectiveness depends on how well the tools are connected to learners' needs and classroom realities (Jihan & Maharsi, 2024; Napitupulu, 2023).

Digital technology becomes educationally valuable not because it is novel, but because specific affordances can support learning processes that conventional instruction may provide less consistently. Quizizz, Kahoot!, and Wordwall can transform routine practice into interactive tasks in which learners receive rapid feedback, repeat activities, compare responses, and participate individually or collaboratively. Immediate feedback can help learners identify errors while the task remains cognitively active, whereas repeated attempts can support retrieval and consolidation. Quizizz has been associated with formative assessment, real-time feedback, automated scoring, and learner participation (Asmarani & Anwar, 2025; Zhang & Crawford, 2024). Kahoot! has similarly been linked to interaction, motivation, and classroom engagement (Napitupulu, 2023; Tao & Zou, 2023), while Wordwall has been associated with behavioral, cognitive, and emotional engagement (Solihat & Rachmawati, 2026). More broadly, research suggests that pedagogical design, rather than technology availability alone, determines whether digital tools contribute meaningfully to learning (Liu et al., 2023).

Game-based learning provides a complementary framework in which instructional objectives are pursued through goals, rules, challenge, feedback, competition, cooperation, and repeated performance. Reviews of digital game-based second-language learning identify challenge, interactivity, feedback, learner control, and goal orientation as recurring features associated with positive linguistic and affective outcomes (Acquah & Katz, 2020; Dixon et al., 2022). Meta-analytic evidence also suggests that gamification can support cognitive, motivational, and behavioral outcomes, although effects vary by context and design (Sailer & Homner, 2020). Recent empirical studies provide converging evidence: digital gamification has been associated with stronger language achievement and foreign-language enjoyment (Liu et al., 2024), while digital educational games have produced gains in secondary-school learners' English listening, vocabulary, and attitudes toward English lessons (Tevetoğlu & Korkmaz, 2024). Zhang et al. (2023) further found that behavioral, cognitive, and emotional engagement were interconnected during digital game-based vocabulary learning, while Yang et al. (2025) showed that game-supported learning could encourage repeated participation among learners experiencing foreign-language anxiety. These findings suggest that games may create comparatively low-risk spaces in which errors become part of practice rather than definitive failure.

Empirical evidence nevertheless remains mixed. Digital games have produced positive effects on language development, motivation, and participation among school-aged learners (Acquah & Katz, 2020; Dixon et al., 2022), while gamified formative assessment has been associated with performance, motivation, satisfaction, and engagement (Li et al., 2025; Zhang & Crawford, 2024). Recent secondary-school evidence also shows that Kahoot-supported instruction can strengthen vocabulary retention and learner perceptions, although students may still experience time pressure and technical constraints (Farhane, 2025). Yet game elements do not guarantee stronger learning. Philpott and Son (2022) found that leaderboard-based competition could encourage externally regulated motivation without necessarily improving performance. In addition, much digital game-based language research concentrates on vocabulary or a single outcome, leaving less evidence about broader proficiency across receptive and productive skills (Acquah & Katz, 2020; Dixon et al., 2022). Research on mobile language applications similarly indicates that different technological features may influence learning differently across skills (Booton et al., 2023). These patterns point to the need for classroom-based studies that examine several learning outcomes at the same time.

Proficiency alone provides an incomplete account of technology-supported learning. For this study, the relationships among digital/game features, learner engagement, and language performance were organized as an affordance–engagement–practice framework. In this framework, immediate feedback and repeated attempts provide opportunities for noticing and practice; manageable challenge and peer interaction can sustain behavioral, cognitive, and emotional engagement; and stronger engagement can expand opportunities to use English. These processes are shaped by teacher support, task design, and curriculum alignment rather than by technology in isolation (Hiver et al., 2021; Wang et al., 2024; Zhang et al., 2023). Controlled and mixed-methods evidence likewise links digital game-based learning with enjoyment, intrinsic

motivation, and achievement, supporting the view that affective processes are part of the learning mechanism rather than incidental outcomes (Liu et al., 2024; Zhou, 2024). Evidence also connects learner engagement with proficiency beyond a single classroom context (Uztosun & Sundqvist, 2025). The framework therefore predicts association rather than direct causation: digital/game affordances are expected to matter when pedagogical conditions convert them into sustained engagement and language practice.

Several gaps therefore converge into a single research problem. Digital game-based language studies often emphasize vocabulary or a single affective outcome, while school-based research that examines broader proficiency, multidimensional engagement, and classroom-process evidence together remains limited (Acquah & Katz, 2020; Dixon et al., 2022; Li et al., 2025). Indonesian studies have documented positive perceptions of particular applications, but less is known about how proficiency gains and engagement patterns co-occur when digital tools are combined with locally adapted activities in ordinary secondary classrooms (Jihan & Maharsi, 2024; Mahbubah & Anam, 2022; Napitupulu, 2023). Recent Indonesian secondary-school evidence on Kahoot-based EFL learning further shows that engagement, motivation, and achievement can vary with instructional conditions, underscoring the need to examine how pedagogy shapes digital-game outcomes rather than treating the platform itself as the explanatory factor (Suyitno & Anwar, 2026). The problem is therefore not whether games are generally beneficial, but under what classroom conditions technology-supported game activities are associated with meaningful language practice and pre–post change.

The study's novelty lies in testing this affordance–engagement–practice framework within an Indonesian secondary EFL classroom while integrating broader proficiency, motivation, multidimensional engagement, observations, interviews, and platform records. Rather than treating technology, motivation, engagement, and proficiency as separate outcomes, the study examines whether curriculum-aligned digital and locally adapted game activities provide feedback, repetition, challenge, and interaction that coincide with stronger engagement and more sustained opportunities to practice English. Curriculum alignment and teacher mediation are treated as boundary conditions, consistent with recent work emphasizing pedagogical design and the relationship between formal instruction and learners' wider language experiences (Lai & Sundqvist, 2026; Liu et al., 2023; Schurz & Sundqvist, 2025). The resulting contribution is therefore not another demonstration that a digital platform can raise scores, but a classroom-based explanation of the conditions under which digital/game affordances are associated with learning-related change.

An additional concern is the alignment between externally validated assessment formats and what learners have actually been taught. International proficiency frameworks can strengthen comparability, but classroom-based research also requires content that is instructionally relevant to the target group. For secondary EFL learners, this means that assessment tasks should represent communicative demands appropriate to their proficiency level while avoiding linguistic structures or genres that have not been part of prior instruction. The CEFR can support this balance when it is used as a reference framework rather than as a rigid substitute for the local curriculum (Council of Europe, 2020). In the present study, this principle informed both the intervention and the assessment design: digital tasks, locally adapted games, and proficiency measures were selected to reflect Grade XI learning objectives while maintaining recognizable A2-B1 task characteristics. This alignment is methodologically important because it strengthens the interpretation that observed changes represent development in targeted classroom learning rather than familiarity with unrelated test content.

Accordingly, this study examines pre–post changes in English proficiency, motivation, and engagement associated with curriculum-aligned digital and game-based learning among Indonesian secondary EFL learners. A mixed-methods pre-experimental one-group pre-test–post-test design combined language assessments, motivation and engagement questionnaires, classroom observations, semi-structured interviews, and digital-platform records. Three questions guided the study: (RQ1) What pre–post changes in English language proficiency are observed following the intervention? (RQ2) What pre–post changes in motivation and engagement are observed, and how are these variables associated with proficiency gains? (RQ3) How do students describe their experiences of digital technology and educational games in English learning?

Method

This study employed a mixed-methods pre-experimental one-group pre-test–post-test design. The label pre-experimental is used because all participants received the intervention

and no randomized or parallel comparison group was available. Quantitative data documented within-participant changes in proficiency, motivation, and engagement, while qualitative data explained how students experienced the activities. The strands were integrated during interpretation to examine convergence and complementarity (Creswell & Plano Clark, 2018; Mackey & Gass, 2022). This design supports analysis of pre–post change in a naturally occurring classroom but does not permit strong causal attribution.

The design was selected because the intervention was embedded in regular instruction and the school timetable did not permit random assignment or creation of a parallel control class. Accordingly, statistical results are interpreted as within-group pre–post gains and associations, not as proof that the intervention alone caused the observed changes. Test and questionnaire data established patterns of change, whereas observations, interviews, and platform analytics were used to examine plausible classroom processes associated with those patterns. The study was conducted at SMA Negeri 2 Kota Tanjung balai, a public upper-secondary school in North Sumatra, Indonesia. Participants were 60 Grade XI students aged 16-17 years enrolled in regular EFL classes. Intact classes were used because random allocation was not feasible within the normal timetable, a common constraint in classroom-based educational research (Mackey & Gass, 2022). To maintain comparability, all assessment tasks and instructional activities were aligned with content that students had previously encountered in the Indonesian secondary-school curriculum.

The intervention lasted eight weeks and comprised 16 sessions conducted twice weekly for approximately 80-90 minutes per session. Quizizz, Kahoot!, and Wordwall were combined with locally adapted educational games to support vocabulary, grammar, reading, listening, speaking, and writing. Digital tasks provided immediate feedback and repeated attempts, whereas classroom games encouraged interaction, collaboration, problem solving, and manageable competition. The teacher introduced learning objectives, explained procedures, monitored participation, provided linguistic support, and moderated competition. This design reflected evidence that feedback, challenge, interactivity, and teacher scaffolding are central to effective technology-enhanced language learning (Acquah & Katz, 2020; Dixon et al., 2022; Wang et al., 2024). English proficiency was assessed at approximately CEFR A2–B1 level using task formats adapted from publicly available Cambridge English A2 Key for Schools and B1 Preliminary for Schools materials. Reading, listening, speaking, and writing tasks were selected or adapted to match students' instructional experience, while grammar and vocabulary items focused on structures already taught. CEFR descriptors served as an external proficiency reference rather than a substitute for the local curriculum (Council of Europe, 2020). Content alignment was checked against Grade XI learning objectives and previously taught materials. [AUTHOR VERIFY: briefly state who reviewed the adapted items and the content-validity procedure used.]

Pre- and post-tests used parallel task structures, comparable timing, and the same scoring criteria. Speaking and writing were evaluated analytically for task fulfillment, organization/interaction, grammatical control, vocabulary use, and comprehensibility. [AUTHOR VERIFY: state the number and qualifications of raters, whether scripts/performances were double-rated, how disagreements were resolved, and report the observed inter-rater reliability coefficient.] These details are necessary to demonstrate scoring consistency rather than assuming that equivalent tasks alone ensure reliable measurement. Motivation and engagement were measured before and after the intervention using a researcher-developed five-point Likert questionnaire containing 24 closed-response items across seven domains—interest/enjoyment, perceived competence, effort/persistence, perceived usefulness, autonomy, social relatedness, and attitudes toward technology—plus two optional open-ended prompts. The domains were derived from multidimensional accounts of language-learning engagement and gamified learning (Hiver et al., 2021; Zhang & Crawford, 2024; Zhang et al., 2023). Before implementation, the instrument package was reviewed during the TIRF mentor-review stage for clarity, construct coverage, and suitability for the target learners, and wording was refined accordingly. [AUTHOR VERIFY: insert the pilot/content-validity procedure actually conducted and the observed Cronbach's alpha for the total scale and, if calculated, each subscale.] Composite scores should be interpreted only after these reliability values are confirmed.

Qualitative and process data were collected through classroom observations, semi-structured interviews, and analytics from Quizizz, Kahoot!, and Wordwall. Observation records focused on participation, persistence, strategy

use, peer interaction, and emotional responses. Interview participants were purposively selected to represent different achievement and participation profiles. [AUTHOR VERIFY: insert the final number of interviewees, interview duration, language used, recording/transcription procedure, and setting.] Platform records included response accuracy, attempts, participation, and task completion. Using multiple sources supported methodological triangulation rather than treating self-report as the sole evidence of engagement.

Observations were distributed across the eight-week intervention so that changes in participation could be traced over time. Interview data were analyzed through reflexive thematic analysis involving repeated familiarization, initial coding, development and refinement of candidate themes, and interpretation in relation to observation and platform evidence (Braun & Clarke, 2021). Trustworthiness was supported through triangulation across interviews, classroom observations, and digital records, by retaining an explicit link between coded evidence and reported themes, and by preserving discrepant evidence—such as frustration with rankings and technical interruptions—rather than reporting only positive cases. [AUTHOR VERIFY: add any further procedures actually used, such as second-coder review, peer debriefing, member checking, or an audit trail; do not add procedures that were not conducted.]

Data collection followed a fixed sequence: proficiency pre-test, baseline questionnaire, eight-week intervention with ongoing observations and platform records, post-test, final questionnaire, student interviews, and extraction of digital analytics. Quantitative analyses included descriptive statistics, paired-samples t tests for the two prespecified composite outcomes, Cohen's d, correlations, and Cronbach's alpha. Component-level language and questionnaire-domain changes were summarized descriptively; because separate inferential tests were not run for each component, no familywise multiple-comparison correction was applied to those descriptive comparisons. [AUTHOR VERIFY: report the actual assumption checks used for the paired t tests, such as inspection of difference-score distributions/Q–Q plots or Shapiro–Wilk results.] Qualitative data were analyzed thematically and integrated with quantitative findings during interpretation. Permission was obtained from the school before data collection. Because participants were minors, parental or guardian consent and student assent were obtained. Participation was voluntary, withdrawal had no effect on grades or instruction, and personal identifiers were replaced with anonymous codes. Electronic data were stored in password-protected files. Particular attention was given to the teacher-researcher power relationship by separating research participation from routine academic grading (Mackey & Gass, 2022).

Findings and Discussion

The study involved 60 Grade XI students aged 16-17 years who completed the full intervention and both proficiency assessments. Participant and intervention characteristics are summarized in Table 1.

Table 1. Participant characteristics

Characteristic	Description
Number of participants	60 students
Grade level	Grade XI
Age range	16-17 years
Educational setting	Public upper-secondary school
English learning context	English as a Foreign Language (EFL)
Intervention duration	8 weeks
Number of sessions	16 sessions
Session frequency	Twice weekly
Session duration	80-90 minutes
Digital platforms used	Quizizz, Kahoot!, Wordwall
Additional activities	Locally adapted educational games

Students' overall proficiency increased substantially after the intervention. The mean total score rose from 64.18 (*SD* = 7.46) at pre-test to 76.52 (*SD* = 6.83) at post-test, a mean gain of 12.34 points. Improvement appeared in every assessed component, with the largest gains in

writing and listening and the smallest in grammar/vocabulary (Table 2).

Table 2. Pre-test and post-test English proficiency scores

Language component	Pre-test Mean	Pre-test SD	Post-test Mean	Post-test SD	Mean gain
Reading	13.20	2.11	15.88	1.82	2.68
Listening	12.74	2.04	15.62	1.76	2.88
Writing	12.11	2.23	15.36	1.91	3.25
Speaking	13.06	1.98	15.27	1.79	2.21
Grammar/Vocabulary	13.07	1.87	14.39	1.68	1.32
Overall proficiency	**64.18**	**7.46**	**76.52**	**6.83**	**12.34**

A paired-samples t test showed a statistically significant pre–post difference in overall proficiency, $t(59) = 11.27$, $p < .001$. The mean increase was 12.34 points, with a derived 95% confidence interval of approximately [10.15, 14.53], and Cohen's d = 1.46 indicated a large standardized within-group difference. Because there was no comparison group, these statistics demonstrate substantial pre–post change but do not establish that the intervention alone caused the gain. Component scores in Table 2 are reported descriptively and were not subjected to separate significance tests, avoiding inflation of Type I error across the five skill components. [AUTHOR VERIFY: insert the actual normality/assumption-check result from the analysis output before resubmission.]

The skill-specific pattern is also noteworthy. Reading increased by 2.68 points, listening by 2.88, writing by 3.25, speaking by 2.21, and grammar/vocabulary by 1.32. The stronger gains in writing and listening may reflect the frequency with which students encountered multimodal prompts and had to transform input into an immediate response. By contrast, grammar/vocabulary showed a smaller gain, suggesting that explicit form control may require longer exposure or more concentrated practice than can be achieved through an eight-week intervention. The fact that every component improved nonetheless indicates that the learning effect was distributed across several dimensions of proficiency rather than being driven by a single subtest. Writing and listening improved most. The intervention repeatedly required students to interpret oral and written prompts, respond within familiar contexts, and produce language during collaborative tasks. Immediate feedback allowed rapid recognition of errors, while repeated attempts created opportunities to apply corrected knowledge. This pattern is consistent with Zhang et al. (2023), who linked digital game-based learning with behavioral, cognitive, and emotional engagement, and with Yang et al. (2025), who reported that game-supported learning can promote participation among anxious language learners. It also parallels secondary-school findings showing gains in English listening and vocabulary after digital educational-game instruction (Tevetoğlu & Korkmaz, 2024) and improved vocabulary retention through Kahoot-supported learning (Farhane, 2025). The present results extend these findings by showing gains across receptive and productive skills rather than vocabulary alone.

The pattern also contributes to the broader literature in two respects. First, previous syntheses have often reported positive effects of digital game-based learning while noting that outcomes are concentrated in vocabulary and other discrete language targets (Acquah & Katz, 2020; Dixon et al., 2022). The present results show that a curriculum-based intervention can be associated with simultaneous gains in receptive and productive components, suggesting that game-supported practice can be used beyond isolated lexical learning when activities are embedded across a sequence of lessons. Second, the relatively large overall effect should be interpreted together with the classroom context. The students were not using digital games as an extracurricular supplement; the activities were integrated into regular instruction and repeatedly connected to the same curricular targets assessed at post-test. This coherence between teaching, practice, and assessment is likely to have amplified the observed change and helps explain why the result should not be generalized to any use of games irrespective of instructional design.

The findings should not be interpreted as evidence that technology automatically improves achievement. Gains were more plausibly associated with the way tools and games were connected to previously taught content, interaction, feedback, and teacher facilitation. Philpott and Son (2022) showed that competitive

leaderboards do not necessarily strengthen performance, while Zhang and Crawford (2024) and Zhang et al. (2025) emphasize the importance of motivational and self-regulatory processes. In the present study, points, rankings, and time limits functioned as supporting mechanisms rather than instructional goals. Curriculum-aligned practice and repeated meaningful participation appear to provide the stronger explanation for improvement.

Motivation and engagement also showed a substantial pre–post increase. The overall questionnaire mean rose from 3.14 (SD = 0.46) to 4.02 (SD = 0.39), a mean difference of 0.88. The paired-samples result was $t(59) = 11.93$, $p < .001$, with an approximate 95% confidence interval for the mean difference of [0.73, 1.03] and Cohen's d = 1.54. The seven domain changes in Table 3 are interpreted descriptively rather than as seven additional hypothesis tests. These results therefore indicate a large within-group shift in reported motivation and engagement, while causal attribution remains limited by the non-controlled design.

Table 3. Motivation and engagement scores before and after the intervention

Dimension	Pre-test Mean	Pre-test SD	Post-test Mean	Post-test SD	Mean gain
Interest/Enjoyment	3.18	0.55	4.24	0.46	1.06
Perceived Competence	3.02	0.51	3.91	0.48	0.89
Effort/Persistence	3.21	0.48	4.08	0.43	0.87
Perceived Usefulness	3.34	0.50	4.19	0.42	0.85
Autonomy	2.96	0.57	3.72	0.53	0.76
Social Relatedness	3.25	0.52	4.12	0.45	0.87
Technology Attitudes	3.05	0.60	3.90	0.49	0.85
Overall	**3.14**	**0.46**	**4.02**	**0.39**	**0.88**

Interest and enjoyment showed the largest increase, followed by perceived competence and social relatedness. Autonomy increased least, which is understandable in a formal school setting where students could make strategic choices within tasks but did not determine lesson objectives or assessment requirements. The pattern suggests that the intervention influenced motivation through several pathways: enjoyment, confidence, persistence, perceived usefulness, and social support. The domain pattern adds further nuance to the overall effect. Interest/enjoyment increased by 1.06 points, the largest change among the seven dimensions. Perceived competence increased by 0.89, effort/persistence and social relatedness by 0.87 each, perceived usefulness and technology attitudes by 0.85, and autonomy by 0.76. The smaller autonomy gain is plausible because students participated within teacher-planned lessons: they could choose strategies and collaborate, but they did not determine curricular goals or assessment requirements. The more substantial gains in enjoyment, competence, and relatedness suggest that the intervention changed how students felt about participation as much as it changed their willingness to use technology.

Classroom observations supported the questionnaire results. Participation was initially uneven, with confident students responding most frequently. As the intervention progressed, more learners volunteered answers, discussed alternatives in groups, and remained on task during repeated attempts. Behavioral engagement was particularly visible during timed digital tasks, while cognitive engagement appeared when students reconsidered incorrect responses and explained language choices to peers. Emotional engagement improved as mistakes became less threatening within game-supported activities.

Observation notes also revealed a gradual shift in who participated. Early sessions were dominated by more confident students, while quieter learners often waited for peer confirmation. In later sessions, participation became more distributed, especially in collaborative tasks where answers could be discussed before submission. Students increasingly used peer explanations, checked alternatives, and requested another attempt after incorrect responses. These behaviors suggest that the intervention did not simply increase visible enthusiasm; it also changed the quality of task involvement by encouraging learners to remain cognitively engaged after failure. Motivation and engagement were positively associated with proficiency development. Overall engagement correlated moderately with language-score gains

($r = .49$, $p < .001$), while motivation showed a slightly stronger relationship ($r = .53$, $p < .001$). These relationships do not imply that motivation alone caused achievement, but they suggest that students who became more interested, persistent, and active also tended to make greater linguistic progress. The pattern is consistent with multidimensional views of engagement (Hiver et al., 2021; Zhang et al., 2023), with evidence linking gamified assessment, motivation, and performance (Zhang & Crawford, 2024), and with recent empirical work reporting gains in language achievement and foreign-language enjoyment under digital gamification (Liu et al., 2024; Zhou, 2024).

The correlations also help clarify the role of affective factors. An *r* of .49 between engagement and proficiency gain and an *r* of .53 between motivation and gain indicate moderate associations rather than near-perfect relationships. This is important because achievement was clearly shaped by more than enthusiasm alone. Prior proficiency, task difficulty, attendance, learning strategies, and exposure outside school may also have influenced individual progress. The present findings therefore support a balanced interpretation: motivation and engagement were meaningful components of the learning process, but they operated alongside linguistic practice and instructional support rather than replacing them. This interpretation is consistent with Hiver et al. (2021), who conceptualize engagement as multidimensional and dynamically connected to classroom conditions. Not all game features were beneficial. Some students became frustrated by repeated low rankings, while a few focused on speed rather than understanding. This echoes Philpott and Son's (2022) caution that leaderboard competition can foster externally regulated motivation. Similar practical concerns, including time pressure and technical difficulties, have been reported in secondary EFL Kahoot interventions (Farhane, 2025). The positive motivational pattern observed here is therefore better explained by the broader learning environment—feedback, manageable challenge, collaboration, and repeated opportunities for success—than by competition alone.

Qualitative analysis produced four recurring themes: enjoyment and reduced learning anxiety, immediate feedback and learning awareness, collaboration and peer interaction, and challenges in technology-supported learning (Table 4). These themes helped explain the quantitative changes by showing how students experienced the intervention.

Table 4. Summary of qualitative themes

Theme	Main evidence	Interpretation
Enjoyment and reduced learning anxiety	Lessons felt more relaxed; students were more willing to answer	Game-supported tasks reduced the perceived risk of mistakes
Immediate feedback and learning awareness	Students corrected errors and repeated tasks	Feedback supported noticing, reflection, and repeated practice
Collaboration and peer interaction	Students discussed answers, helped peers, and negotiated choices	Collaborative games increased social support and meaningful interaction
Challenges in technology use	Internet instability, device differences, leaderboard pressure, distraction	Digital learning required careful teacher management and equitable access

Across the interviews, students frequently distinguished between games that merely felt competitive and activities that helped them understand language. They valued games most when they could see why an answer was wrong, discuss it with classmates, and try again. This distinction supports the broader quantitative result: motivational improvement was strongest when challenge was accompanied by feedback and social support. Enjoyment and Reduced Learning Anxiety. Students commonly described game-supported lessons as more enjoyable and less intimidating, and incorrect responses were increasingly treated as part of practice rather than final failure. [INSERT VERBATIM QUOTE FROM TRANSCRIPT, e.g., Participant P__, illustrating reduced anxiety/willingness to answer.] This pattern is consistent with Yang et al. (2025), although time limits and competitive rounds still created pressure for some less confident learners.

Immediate Feedback and Learning Awareness. Students repeatedly identified rapid feedback as useful because they could recognize an error and modify a later response. Repeated attempts also helped them notice vocabulary, grammar, and reading patterns they had initially misunderstood. [INSERT VERBATIM QUOTE FROM TRANSCRIPT, Participant P__, on immediate feedback or retrying.] The pedagogical value of feedback therefore lay in the response–correction–reflection–retry cycle,

consistent with the cognitive engagement described by Zhang et al. (2023).

Collaboration and Peer Interaction. Group-based activities required learners to compare answers, explain vocabulary, negotiate choices, and support classmates who were less confident with English or technology. [INSERT VERBATIM QUOTE FROM TRANSCRIPT, Participant P__, on peer help/collaboration.] Locally adapted games were especially useful because success often depended on cooperation rather than individual ranking, supporting the increase in social relatedness reported in Table 3. The collaboration theme further illustrates how locally adapted games complemented digital platforms. Digital applications were efficient for rapid individual responses and immediate scoring, whereas face-to-face games allowed more flexible grouping, explanation, and negotiation. Using both formats reduced dependence on a single device-based mode and enabled the teacher to shift toward collaborative activity when technical access became uneven. In this sense, the local games were not an optional addition but part of the intervention's contextual adaptability. Challenges in Technology Use. Students encountered unstable internet connections, differences in device performance, varying familiarity with applications, and occasional distraction. Competition also had mixed effects: rankings motivated some learners but discouraged others. [INSERT VERBATIM QUOTE FROM TRANSCRIPT, Participant P__, illustrating a technical or competitive challenge.] These findings reinforce the need for teacher mediation to balance accessibility, competition, collaboration, and curricular purpose.

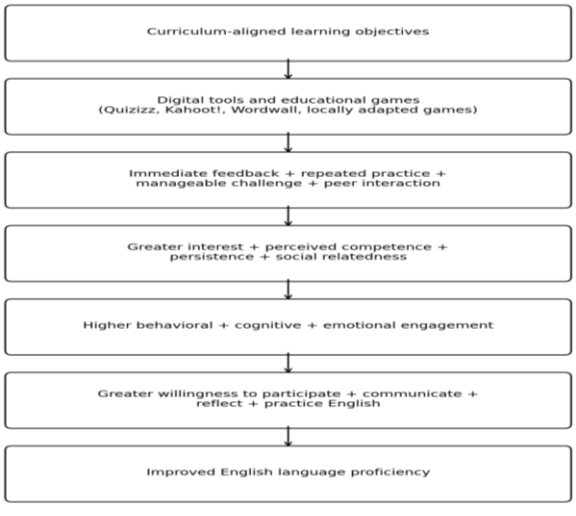
Taken together, the findings support the affordance–engagement–practice framework proposed in the Introduction rather than a direct technology-effect explanation. Curriculum-aligned digital and locally adapted game activities supplied four recurring affordances—feedback, repetition, manageable challenge, and interaction. These affordances coincided with stronger behavioral, cognitive, and emotional engagement, which in turn accompanied more frequent attempts, discussion, reflection, and language practice. The model therefore positions engagement as a process linking instructional affordances with opportunities to practice, while curriculum alignment and teacher mediation function as boundary conditions. This is the study's central theoretical contribution: technology is not treated as the causal agent; its educational value depends on how pedagogical design organizes learner activity and how learners respond to those conditions.

Feedback and repetition were central to this process. Students could identify incorrect responses, reconsider them, and encounter similar language in subsequent tasks. Zhang et al. (2023) reported comparable relationships between engagement and vocabulary development in digital game-based environments, while Liu et al. (2024) found that digital gamification can support both language achievement and positive affective outcomes. In the present study, however, the mechanism extended across reading, listening, writing, speaking, and grammar/vocabulary, suggesting that feedback-rich interaction may support broader development when tasks are connected to relevant instructional content. Interaction represented a second pathway. Engagement was strongest when students compared answers, explained choices, and collaborated rather than simply competing for points. Manageable challenge combined with social support helped sustain participation, which also explains the rise in social relatedness and the positive association between engagement and proficiency gains. Motivation and achievement appeared reciprocal: greater competence encouraged participation, while successful participation provided evidence of progress and encouraged further persistence. This interpretation aligns with Zhang et al. (2025) and with recent Indonesian secondary-school evidence showing that engagement and motivation are closely tied to perceived learning benefits and achievement in Kahoot-based EFL instruction (Suyitno & Anwar, 2026).

Convergence across the quantitative and qualitative strands strengthens this interpretation without turning it into a causal claim. Higher post-intervention motivation and engagement occurred alongside higher proficiency scores, and the moderate correlations ($r = .49$ for engagement gains and $r = .53$ for motivation gains) indicate meaningful associations rather than deterministic relationships. Observations and interviews supplied process evidence that is compatible with those associations: students remained on task, attempted more responses, discussed errors, and returned to tasks after failure. Thus, the novel contribution is not simply that scores increased, but that the combined evidence identifies a plausible pedagogical pathway through which curriculum-aligned feedback, repetition, interaction, and teacher mediation can support engagement and sustained language practice.

Curriculum alignment was equally important. Activities were linked to structures, vocabulary, and text types students had already encountered in Grade XI English instruction. This strengthened both pedagogical relevance and interpretation of assessment results. The implication is straightforward: teachers should begin with what students have been taught and are expected to learn, then select digital tools or game mechanics that support those objectives. Technology should follow pedagogy, not replace it. This interpretation also explains why the contextualized writing task was useful. Instead of asking learners to write about an unfamiliar abstract issue, the task required them to discuss game-based learning that they had directly experienced. Familiar content reduced the conceptual burden and allowed the assessment to focus more clearly on productive language use, organization, grammar, and vocabulary. At the same time, the task remained sufficiently open to reveal differences in students' ability to explain benefits, challenges, and possible solutions. The writing results therefore reflected both curriculum alignment and authentic experience, reinforcing the broader principle that assessment should be closely connected to the construct and learning opportunities provided during instruction. Teacher facilitation connected all stages of the intervention. Automated feedback and scores were useful, but the teacher remained responsible for explaining errors, organizing collaboration, moderating competition, and ensuring that digital tools served learning. The integrated mechanism is summarized in Figure 1.

Figure 1.
Integrated mechanism of digital and game-based EFL learning



Teacher facilitation and curriculum alignment operate across all stages.

The integrated findings therefore refine a common claim in digital game-based learning: the relevant question is not whether technology is inherently effective, but which pedagogical conditions allow its affordances to support learning. In this study, curriculum alignment established relevance, feedback and repeated attempts supported noticing and practice, interaction sustained engagement, and teacher mediation prevented competition or technical constraints from displacing the language objective. By linking these conditions to multidimensional engagement and broader proficiency within one secondary EFL classroom, the study extends prior work beyond platform-specific outcome claims while maintaining appropriately cautious interpretation for a non-controlled design.

Conclusion

The study documented substantial pre–post gains in English proficiency, motivation, and engagement following an eight-week curriculum-aligned digital and game-based learning program. Scores increased across reading, listening, writing, speaking, and grammar/vocabulary, with the strongest descriptive gains in writing and listening. Motivation and engagement also increased, and their changes were moderately associated with proficiency gains. Because the design did not include a comparison group, these findings should be interpreted as within-group changes and associations rather than evidence that the intervention alone caused the outcomes. The study's main contribution is a classroom-based explanatory mechanism rather than a claim that digital games are universally beneficial. The evidence suggests that digital/game affordances become educationally useful when curriculum alignment, immediate feedback, repeated practice, interaction, and teacher mediation work together to increase meaningful participation. For Indonesian secondary EFL classrooms, this supports selective integration of accessible platforms such as Quizizz, Kahoot!, and Wordwall alongside locally adapted activities, especially where technological resources are uneven.

Pedagogically, these findings argue for selective rather than maximal use of technology. A small number of accessible tools can be effective when tasks are carefully sequenced, related to existing curriculum, and supported by teacher feedback. This is particularly relevant for resource-constrained schools, where the feasibility of an intervention matters as much as its novelty. Several limitations remain. The study involved 60 Grade XI students from one school, used a pre-experimental one-group design without a comparison class, and lasted eight

weeks; generalizability and causal inference are therefore limited. Future studies should use larger multi-school samples, comparison or randomized groups where feasible, longer follow-up periods, and preregistered primary outcomes. Replication should also report instrument validation, rater reliability, and qualitative trustworthiness procedures in full so that the proposed classroom mechanism can be tested more rigorously across contexts.

References

Acquah, E. O., & Katz, H. T. (2020). Digital game-based L2 learning outcomes for primary through high-school students: A systematic literature review. Computers & Education, 143, 103667. https://doi.org/10.1016/j.compedu.2019.103667

Asmarani, D. A., & Anwar, R. (2025). The use of Quizizz as a digital-based formative assessment tool in English language teaching. Research on English Language Education, 7(2), 40–52. https://doi.org/10.57094/relation.v7i2.2940

Booton, S. A., Hodgkiss, A., & Murphy, V. A. (2023). The impact of mobile application features on children's language and literacy learning: A systematic review. Computer Assisted Language Learning, 36(3), 400–429. https://doi.org/10.1080/09588221.2021.1930057

Braun, V., & Clarke, V. (2021). Thematic analysis: A practical guide. SAGE Publications.

Council of Europe. (2020). Common European framework of reference for languages: Learning, teaching, assessment—Companion volume. Council of Europe Publishing.

Creswell, J. W., & Plano Clark, V. L. (2018). Designing and conducting mixed methods research (3rd ed.). SAGE Publications.

Dixon, D. H., Dixon, T., & Jordan, E. (2022). Second language (L2) gains through digital game-based language learning (DGBLL): A meta-analysis. Language Learning & Technology, 26(1), 1–25. https://doi.org/10.64152/10125/73464

Farhane, H. (2025). An investigation of the effect of Kahoot on vocabulary retention among Moroccan EFL secondary school students: A quasi-experimental study. Journal of English Language Teaching and Applied Linguistics, 7(3), 242–257. https://doi.org/10.32996/jeltal.2025.7.3.25

Hiver, P., Al-Hoorie, A. H., & Mercer, S. (Eds.). (2021). Student engagement in the language classroom. Multilingual Matters. https://doi.org/10.21832/9781788923613

Ishaq, K., Mat Zin, N. A., Rosdi, F., Jehanghir, M., Ishaq, S., & Abid, A. (2021). Mobile-assisted and gamification-based language learning: A systematic literature review. PeerJ Computer Science, 7, e496. https://doi.org/10.7717/peerj-cs.496

Jihan, C. N., & Maharsi, I. (2024). An EFL students' perception towards game-based learning in secondary school: A descriptive qualitative study. J-SHMIC: Journal of English for Academic, 11(2), 168–179. https://doi.org/10.25299/jshmic.2024.vol11(2).17131

Lai, C., & Sundqvist, P. (2026). Research agenda: Synergizing in-class and out-of-class language learning with technology. Language Teaching, 59(1), 60–81. https://doi.org/10.1017/S026144482500014X

Li, C., Fryer, L. K., & Chu, S. K. W. (2025). Utilising gamified formative assessment to support English language learning in schools: A scoping review. Innovation in Language Learning and Teaching, 19(2), 188–204. https://doi.org/10.1080/17501229.2024.2352789

Liu, G.-Z., Fathi, J., & Rahimi, M. (2024). Using digital gamification to improve language achievement, foreign language enjoyment, and ideal L2 self: A case of English as a foreign language learners. Journal of Computer Assisted Learning, 40(4), 1347–1364. https://doi.org/10.1111/jcal.12954

Liu, T., Zhang, Z., & Gao, X. (2023). Pedagogical design in technology-enhanced language education research: A scoping review. Sustainability, 15(7), 6069. https://doi.org/10.3390/su15076069

Mackey, A., & Gass, S. M. (2022). Second language research: Methodology and design (3rd ed.). Routledge.

Mahbubah, L., & Anam, S. (2022). Students' perceptions of the implementation of Kahoot! in English language teaching. Lingua Scientia, 29(1), 23–32. https://doi.org/10.23887/ls.v29i1.35644

Napitupulu, T. C. N. (2023). EFL students' perception of using Kahoot application in vocabulary learning: The case of secondary school in Indonesia. Journal of English Teaching and Learning, 3(1), 20–30. https://doi.org/10.62734/jetling.v3i1.214

Oei, B. B., Mustofa, A., & Anam, S. (2024). The role of extramural English exposure as revealed in the language accuracy of secondary school EFL writers. Issues in Language Studies, 13(1), 391–412. https://doi.org/10.33736/ils.6098.2024

Philpott, A., & Son, J.-B. (2022). Leaderboards in an EFL course: Student performance and motivation. Computers & Education, 190, 104605. https://doi.org/10.1016/j.compedu.2022.104605

Rakhmannia, E. D. (2022). The implementation of code mixing and code switching in EFL class. Exposure: Jurnal Pendidikan Bahasa Inggris,

11(2), 466–472. https://doi.org/10.26618/exposure.v11i2.9059

Reinhardt, J., & Bain, L., IV. (2026). Digital games and gaming in language learning and teaching. Language Teaching, 59(3), 269–292. https://doi.org/10.1017/S0261444826101177

Sailer, M., & Homner, L. (2020). The gamification of learning: A meta-analysis. Educational Psychology Review, 32(1), 77–112. https://doi.org/10.1007/s10648-019-09498-w

Schurz, A., & Sundqvist, P. (2025). Considering extramural English in class: Exploring teachers' activity ideas in secondary school classrooms in four countries. Applied Linguistics, Advance online publication, amaf078. https://doi.org/10.1093/applin/amaf078

Solihat, R. M., & Rachmawati, D. (2026). Wordwall as a digital tool for promoting students' learning engagement. Journal of English Language Teaching and Cultural Studies, 9(1), 69–79. https://doi.org/10.48181/jelts.v9i1.35351

Suyitno, & Anwar, K. (2026). Instructional language in Kahoot!-based EFL learning: A quasi-experimental study in Indonesian secondary schools. Indonesian EFL Journal, 12(2). https://doi.org/10.25134/ieflj.v12i2.153

Tao, Y., & Zou, B. (2023). Students' perceptions of the use of Kahoot! in English as a foreign language classroom learning context. Computer Assisted Language Learning, 36(8), 1668–1687. https://doi.org/10.1080/09588221.2021.2011323

Tevetoğlu, K., & Korkmaz, Ö. (2024). The effects of digital educational games on secondary school students' attitudes towards elective English class and on increasing their English listening skills and vocabulary. Participatory Educational Research, 11(3), 79–97. https://doi.org/10.17275/per.24.35.11.3

Uztosun, M. S., & Sundqvist, P. (2025). Extramural English in Türkiye: Scale development, learner engagement and L2 English proficiency. SAGE Open, 15(4). https://doi.org/10.1177/21582440251396680

Wang, J., Zhou, H., Chen, S., Tong, H., & Yang, Y. (2024). How teachers support secondary school students to become self-regulated learners in technology-enhanced language learning. System, 123, 103313. https://doi.org/10.1016/j.system.2024.103313

Yang, Y.-F., Goh, A. P. I., Hu, C.-C., Chen, N.-S., & Lai, S.-C. (2025). Digital game-playing to enhance English vocabulary and content learning among anxious foreign language students. Computer Assisted Language Learning, 38(8), 2232–2259. https://doi.org/10.1080/09588221.2024.2371383

Zhang, R., Zou, D., & Cheng, G. (2023). Learner engagement in digital game-based vocabulary learning and its effects on EFL vocabulary development. System, 119, 103173. https://doi.org/10.1016/j.system.2023.103173

Zhang, R., Zou, D., & Cheng, G. (2025). Self-regulated digital game-based vocabulary learning: Motivation, application of self-regulated learning strategies, EFL vocabulary knowledge development, and their interplay. Computer Assisted Language Learning, 38(8), 1961–2003. https://doi.org/10.1080/09588221.2024.2344555

Zhang, Z., & Crawford, J. (2024). EFL learners' motivation in a gamified formative assessment: The case of Quizizz. Education and Information Technologies, 29, 6217–6239. https://doi.org/10.1007/s10639-023-12034-7

Zhou, S. (2024). Gamifying language education: The impact of digital game-based learning on Chinese EFL learners. Humanities and Social Sciences Communications, 11, 1518. https://doi.org/10.1057/s41599-024-04073-3