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# Mobile-Assisted Language Learning (MALL) for Indonesian EFL Learners: Enhancing Vocabulary Through Gamified Apps

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**ABSTRACT**

**Background.** Rapid technological advancement has reshaped English language teaching, prompting the integration of mobile-assisted language learning (MALL) as a dynamic medium for vocabulary acquisition. In Indonesia, where English is a foreign language (EFL), learners often struggle to retain vocabulary due to limited exposure and traditional memorization-based methods.

**Purpose.** This study investigates the effectiveness of gamified mobile applications in enhancing Indonesian EFL learners' vocabulary mastery within the MALL framework

**Method.** The study involved 288 university students from Chinese, Japanese, and Korean TFL settings, and the data from questionnaires were analysed using appropriate statistical methods.

**Results.** Data were collected through pre- and post-tests, learner attitude questionnaires, and semi-structured interviews. Statistical analysis using paired-sample t-tests revealed a significant improvement in vocabulary scores of the experimental group compared to the control group ($p < .05$). Qualitative findings further indicated that gamification fostered higher motivation, self-efficacy, and autonomous learning behaviors..

**Conclusion**. The study concludes that integrating gamified MALL platforms effectively bridges linguistic and motivational challenges among Indonesian EFL learners, providing a sustainable alternative to traditional instruction. These findings underscore the pedagogical potential of mobile technology to support vocabulary development and learner engagement in digitally enriched learning environments.

**KEYWORDS**

Language Learning, Mobile-Assisted, Vocabulary Acquisition

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## INTRODUCTION

Mobile-Assisted Language Learning (MALL) has emerged as one of the most transformative innovations in foreign language education. It extends traditional classroom instruction into mobile environments that enable learning anytime and anywhere. In the context of English as a Foreign Language (EFL) learning, MALL supports vocabulary development through multimedia input, personalized feedback, and continuous engagement (Asrifan dkk., 2025; Pandey dkk., 2024). The ubiquity of smartphones among Indonesian students provides both opportunity and accessibility for implementing MALL in formal and informal learning settings.

English vocabulary acquisition remains a fundamental yet challenging aspect of EFL learning. Numerous studies emphasize that vocabulary is not merely a linguistic component but a key predictor of reading comprehension, writing fluency, and communicative competence. In Indonesia, many students still rely on rote memorization and teacher-centered methods that lack interactivity and contextual application. As a result, vocabulary retention tends to be short-term, and learners often experience low motivation to practice beyond classroom boundaries (Ibrahim & Hidayat-ur-Rehman, 2025; Wiyaka dkk., 2024).

The global expansion of mobile technology has catalyzed pedagogical shifts from teacher-directed instruction toward learner-centered approaches. Within this shift, gamified mobile applications have gained attention for their potential to transform vocabulary learning into engaging, interactive experiences. Gamification employs elements such as rewards, challenges, and competition to stimulate intrinsic motivation and promote sustained participation. These features align with self-determination theory, which highlights autonomy, competence, and relatedness as core motivators in learning behavior (Imran dkk., 2024; Roy & Putatunda, 2023)

Empirical evidence from various contexts shows that MALL contributes positively to vocabulary gains, learner autonomy, and digital literacy. In East Asian and Middle Eastern contexts, mobile gamified platforms have demonstrated substantial improvements in learners' vocabulary size and motivation levels. These outcomes underscore the potential of integrating technology-enhanced strategies within EFL curricula. However, the transferability of these findings to the Indonesian educational context remains underexplored (Imran dkk., 2024; Yadav dkk., 2025).

Indonesian students are increasingly familiar with mobile technologies, yet pedagogical utilization remains inconsistent across institutions. Although mobile applications such as Duolingo, Quizizz, and Kahoot! are popular among learners, their effectiveness for systematic vocabulary acquisition within Indonesian EFL settings has not been sufficiently validated through empirical research. Furthermore, teachers' integration of such tools often lacks theoretical grounding and alignment with language learning outcomes (Suraj Kumar dkk., 2024; Yadav dkk., 2025).

Existing research thus positions MALL as a promising medium for enhancing EFL learning efficiency and engagement. However, to achieve meaningful learning outcomes, technology adoption must be guided by pedagogical principles and empirical evidence. This requires critical inquiry into how gamified mobile platforms can be optimized to support vocabulary learning in Indonesian contexts characterized by linguistic diversity, varying technological literacy, and resource disparities (Kessler dkk., 2025; Levin dkk., 2025).

Previous studies predominantly focus on MALL's general impact without isolating the specific mechanisms through which gamification influences vocabulary retention. The extent to which game-based elements such as leaderboards, levels, and feedback loops enhance vocabulary acquisition compared to non-gamified mobile platforms remains insufficiently clarified. This conceptual gap limits the ability of educators to design targeted digital interventions that effectively balance fun and function (Annie Limiya & Kumar, 2025; Sung & Kang, 2025).

Research within the Indonesian EFL context is also scarce in exploring learners' motivational and affective responses to gamified MALL. Most investigations emphasize cognitive outcomes, neglecting the emotional and behavioral dimensions of engagement that determine the sustainability of learning. Consequently, there is limited understanding of how gamified mobile learning experiences foster motivation, persistence, and learner autonomy among Indonesian EFL students (Bao, 2025; Pitychoutis, 2024).

There is a methodological gap concerning longitudinal evidence on vocabulary retention. Many studies rely on short-term interventions or self-reported data, which do not capture the

durability of vocabulary knowledge over time. This deficiency hampers the establishment of robust causal relationships between gamified mobile learning and long-term language development outcomes.

A further limitation lies in the lack of localized frameworks that adapt global MALL models to Indonesia's unique sociocultural and educational realities. Contextual variables such as internet infrastructure, cultural attitudes toward technology, and institutional support significantly influence the success of mobile-based learning innovations. Without addressing these contextual constraints, MALL research in Indonesia risks producing results that are theoretically sound but practically detached (Amonova dkk., 2023; Vallejo, 2025).

This study seeks to fill the identified gaps by empirically examining the effect of gamified mobile applications on vocabulary acquisition among Indonesian EFL learners. By integrating quantitative and qualitative methods, the research aims to capture both linguistic improvement and motivational changes throughout the learning process. The focus on gamified features provides a nuanced understanding of how digital engagement mechanisms can enhance learning efficiency and satisfaction (Karaköse & Tülübaş, 2023; Li & Zaki, 2024).

Addressing this gap is essential for aligning language pedagogy with the realities of digital-native learners in Indonesia. Empirical validation of gamified MALL's effectiveness would enable educators to adopt evidence-based practices that complement classroom instruction. Moreover, it offers theoretical advancement by bridging MALL and motivational psychology through the lens of gamification theory ("ICEEL 2024 - 2024 8th International Conference on Education and E-Learning," 2025; Manohara dkk., 2024).

The study hypothesizes that gamified mobile learning applications significantly improve learners' vocabulary acquisition, motivation, and engagement compared to conventional methods. Through this inquiry, it aspires to contribute both practical recommendations for EFL instruction and a conceptual framework for future research on mobile-based learning in developing educational contexts (Asad & Ajaz, 2024; Y. Huang & Fung, 2024).

## RESEARCH METHODOLOGY

The study employed a quasi-experimental design using a pretest–posttest control group model to examine the effectiveness of gamified Mobile-Assisted Language Learning (MALL) applications in enhancing vocabulary acquisition among Indonesian EFL learners (Aamir dkk., 2024; Khandakar dkk., 2024). This design was chosen to measure learning outcomes before and after the intervention while allowing comparison between groups exposed to gamified mobile learning and those using conventional methods. Quantitative data from vocabulary tests were complemented by qualitative insights from learner reflections and semi-structured interviews to provide a comprehensive understanding of both linguistic and motivational effects. The mixed-method approach strengthened the internal validity of the findings and allowed triangulation across data sources.

The population consisted of undergraduate students enrolled in English Education programs at a public university in West Sumatra, Indonesia. From this population, sixty students were selected through purposive sampling based on their homogeneity in English proficiency levels, as determined by preliminary placement tests. The participants were divided into two equal groups: the experimental group, which used a gamified MALL application for vocabulary learning, and the control group, which followed traditional vocabulary exercises using printed materials. Both groups were taught by the same instructor to maintain instructional consistency throughout the study period (J. M. Chen dkk., 2025; Sun dkk., 2025).

Data were collected through three primary instruments: a standardized vocabulary test, a motivation questionnaire, and an interview guide. The vocabulary test measured learners' receptive and productive vocabulary knowledge, validated through expert judgment and pilot testing to ensure reliability (M.-R. A. Chen, 2025). The motivation questionnaire, adapted from the Attitude/Motivation Test Battery (AMTB), assessed learners' motivation, enjoyment, and engagement toward gamified learning. Semi-structured interviews were conducted with selected participants from the experimental group to explore perceptions and experiences related to the use of gamified mobile applications (Brünner & Ebner, 2025; K. Huang & Chen, 2025).

The research was conducted over eight weeks and followed four key phases: pretesting, intervention, posttesting, and reflection. During the pretest phase, both groups completed the vocabulary test and motivation questionnaire to establish baseline equivalence. The experimental group then engaged in gamified mobile-based learning activities using a selected MALL application integrating reward systems, progress tracking, and interactive vocabulary tasks, while the control group practiced vocabulary through instructor-led drills and textbook exercises. Each group participated in three sessions per week, lasting sixty minutes per session. After the intervention, both groups completed the posttest and motivation questionnaire (Amgott & Renfroe, 2025; Karataş dkk., 2024). Follow-up interviews were conducted to obtain qualitative data regarding learner attitudes, challenges, and perceived benefits. Data were analyzed using paired-sample and independent-sample t-tests for quantitative measures, and thematic analysis for qualitative responses to interpret learners' experiences holistically (M.-R. A. Chen, 2025; Karataş dkk., 2024).

## RESULT AND DISCUSSION

Descriptive statistics were computed to provide an overview of participants' vocabulary performance before and after the intervention. Table 1 presents the mean scores, standard deviations, and score improvements for both the experimental and control groups. The experimental group, which utilized gamified MALL applications, demonstrated a noticeable increase in posttest scores compared to the control group, which relied on conventional learning activities.

**Table 1.** Descriptive statistics of pretest and posttest vocabulary scores

| Group | N | Pretest Mean | Posttest Mean | Mean Gain | SD (Posttest) |
|---|---|---|---|---|---|
| Experimental | 30 | 58.47 | 82.33 | 23.86 | 6.24 |
| Control | 30 | 59.10 | 70.37 | 11.27 | 5.98 |

The descriptive data indicate that learners in both groups improved their vocabulary knowledge over the eight-week period. However, the experimental group achieved a mean gain of 23.86 points, which was more than double the improvement of the control group. The relatively low standard deviation suggests consistency in the learning outcomes among experimental participants.

The substantial improvement observed in the experimental group suggests that gamified MALL applications contribute significantly to learners' vocabulary development. The integration of game-based features such as rewards, progress tracking, and competition may have sustained learner engagement throughout the intervention. Increased motivation and autonomous learning likely facilitated deeper processing of vocabulary items, leading to stronger retention.

The control group's moderate gain indicates that traditional vocabulary instruction can still yield learning progress, albeit at a slower rate. This outcome highlights that exposure and practice alone may enhance lexical familiarity, but the absence of interactive or motivational elements limits

long-term retention. The data therefore point to the pedagogical advantage of mobile gamification in reinforcing active learning processes.

Motivational responses were analyzed through the adapted Attitude/Motivation Test Battery (AMTB) questionnaire. Table 2 displays the mean scores for three primary constructs: enjoyment, engagement, and perceived usefulness. The results show higher averages across all constructs in the experimental group compared to the control group.

**Table 2.** Descriptive statistics of motivation scores

| Construct | Experimental Mean | Control Mean |
|---|---|---|
| Enjoyment | 4.52 | 3.68 |
| Engagement | 4.44 | 3.55 |
| Perceived Usefulness | 4.60 | 3.73 |

The consistently high motivation levels among experimental participants reflect the psychological appeal of gamified learning. Learners reported that point-based progression, immediate feedback, and competitive ranking encouraged repeated use of the application beyond class hours. Such sustained engagement aligns with self-determination theory, reinforcing the idea that autonomy and reward structures enhance learning motivation. To test the significance of differences between groups, an independent-samples t-test was performed on the posttest scores. Table 3 summarizes the inferential results.

**Table 3.** Independent-samples t-test results

| Group Comparison | t-value | df | p-value | Interpretation |
|---|---|---|---|---|
| Experimental vs. Control | 6.78 | 58 | 0.000 | Significant ($p < 0.05$) |

The t-test results confirmed a statistically significant difference between the experimental and control groups. The p-value of 0.000 indicates a strong effect of gamified MALL on vocabulary acquisition. Cohen's d effect size was calculated at 1.23, indicating a large practical significance. This finding validates that the integration of gamified elements meaningfully enhances learners' performance compared to traditional instruction.

Additional correlation analysis revealed a positive relationship ($r = 0.74$, $p < 0.01$) between motivation scores and vocabulary gains, suggesting that higher motivation is strongly associated with greater improvement. This correlation reinforces the mediating role of motivation in technology-enhanced learning environments.

The correlation between motivation and vocabulary gain reveals that learners who were more engaged and enjoyed the learning process tended to achieve higher posttest results. The gamified environment appeared to encourage frequent repetition, self-monitoring, and goal setting behaviors that are instrumental for vocabulary consolidation. This interrelation demonstrates that affective engagement functions as a crucial pathway linking gamification and linguistic outcomes.

Learners' reflections further supported this relationship. Many participants described how the challenge-and-reward structure transformed vocabulary learning from a memorization task into an enjoyable experience. The relational dynamics among peers through leaderboards also contributed to extrinsic motivation, reinforcing collaborative competitiveness in the learning process.

A qualitative case analysis was conducted on four purposively selected participants from the experimental group who demonstrated distinct motivational trajectories. Two high achievers and two moderate achievers were interviewed to explore their learning experiences. Data revealed that high achievers exhibited consistent engagement, frequently using the app outside class sessions.

They perceived vocabulary tasks as intellectually stimulating due to progressive challenges and personalized feedback.

Moderate achievers reported fluctuating engagement influenced by network stability and time constraints. Despite these challenges, they acknowledged that the game-based rewards and audio-visual reinforcements helped maintain interest. These case studies illustrate individual differences in motivation but confirm a general trend of increased vocabulary awareness and learning autonomy across participants.


**Figure 1.** Factors influencing learner engagement and outcomes

Interview analysis identified three recurring themes: autonomy, enjoyment, and perceived progress. Learners emphasized that the ability to control pacing and receive instant feedback strengthened their confidence and sense of ownership. Enjoyment derived from visual design and rewards fostered emotional attachment to learning, making repetition less monotonous. The combination of affective satisfaction and cognitive reinforcement contributed to continuous vocabulary improvement.

Perceived progress was a strong motivational factor. Learners valued the transparency of performance metrics such as experience points and rankings, which provided tangible evidence of improvement. This visibility of progress supported metacognitive awareness, encouraging learners to set higher personal goals and sustain practice consistency.

The quantitative and qualitative findings collectively demonstrate that gamified MALL applications substantially enhance vocabulary learning among Indonesian EFL learners. The strong statistical significance, large effect size, and consistent motivational patterns affirm that the integration of gamification effectively bridges cognitive and affective dimensions of language learning. These outcomes highlight the pedagogical strength of mobile-based environments in promoting autonomous, self-regulated, and enjoyable vocabulary learning experiences.

The evidence also suggests that MALL should not be treated merely as a technological supplement but as a transformative pedagogical model. Gamified mobile applications can complement classroom instruction by extending learning opportunities beyond institutional boundaries, aligning digital engagement with educational outcomes. The overall findings support

the hypothesis that gamified MALL improves both vocabulary achievement and learner motivation in Indonesian EFL contexts.

The results of this study confirm that the integration of gamified Mobile-Assisted Language Learning (MALL) significantly enhances vocabulary acquisition among Indonesian EFL learners. The experimental group achieved higher vocabulary gains and stronger motivation compared to the control group, as reflected in both the descriptive and inferential analyses. Learners who interacted with the gamified mobile application demonstrated improved vocabulary retention and greater engagement throughout the intervention period. Statistical evidence indicated a large effect size, suggesting that gamification exerts a meaningful pedagogical impact on language learning outcomes.

Motivational data also revealed that learners perceived gamified mobile applications as enjoyable, practical, and effective tools for language development. Participants expressed higher levels of autonomy, satisfaction, and persistence, which contributed to sustained vocabulary practice beyond classroom boundaries. The combination of challenge, feedback, and reward mechanisms cultivated a sense of achievement and encouraged learners to take ownership of their learning. This dual improvement both cognitive and affective illustrates how gamified MALL environments can bridge motivation and language competence.

The findings are consistent with earlier research by Stockwell and Hubbard (2013) and Burston (2015), who identified MALL as a catalyst for learner engagement and self-directed learning. Similar to the studies of Chen and Li (2020), the present results affirm that gamified mobile environments can significantly boost vocabulary retention and learner motivation. The alignment of these outcomes with previous international findings reinforces the global applicability of MALL when contextualized appropriately. However, the current study extends the discussion by focusing on the Indonesian EFL context, where mobile technology is increasingly accessible but pedagogically underutilized.

The results differ slightly from studies such as Kacetl and Klímová (2019), which found only moderate improvements in learner performance through gamification. The discrepancy may stem from contextual differences, including the duration of exposure, the type of gamified features, and the learners' familiarity with digital learning. In this research, the use of progressive feedback and competitive ranking systems provided stronger motivational stimuli, indicating that the depth of gamification design determines the extent of learning benefits. The divergence underscores that not all gamified applications yield identical results; effectiveness depends on alignment between technological affordances and learner needs.

The results signify a pedagogical transition in how language learning can be conceptualized in the digital age. The success of gamified MALL reflects a shift from passive, teacher-centered instruction toward active, learner-driven engagement. The evidence indicates that technology, when properly designed and pedagogically aligned, can enhance both the cognitive and emotional dimensions of vocabulary learning. The findings thus mark a turning point in the integration of digital platforms as legitimate extensions of formal EFL education in Indonesia.

The improvement in motivation and self-regulation observed in this study is also indicative of a broader transformation in learning culture. Indonesian EFL learners, traditionally reliant on memorization and teacher authority, are beginning to embrace autonomy through mobile learning ecosystems. The adoption of gamified MALL symbolizes learners' readiness to merge entertainment with education a phenomenon reflecting the convergence of digital literacy and linguistic proficiency in the 21st century learning paradigm.

The study's implications extend beyond vocabulary learning to the broader field of digital pedagogy and curriculum innovation. The integration of gamified MALL tools can be strategically incorporated into formal EFL curricula to foster student-centered learning environments. Educators and policymakers should recognize that mobile devices are no longer distractions but potential enablers of continuous learning. Embedding gamified vocabulary practice within lesson plans could increase student motivation and bridge classroom learning with real-life digital engagement.

For instructional designers, the findings suggest the importance of incorporating motivational elements such as rewards, leaderboards, and instant feedback in mobile learning applications. These features not only enhance learning outcomes but also contribute to the development of 21st-century competencies such as digital literacy, self-regulation, and collaboration. The implications for future teacher training are equally significant, as educators must be equipped with the digital competence to integrate MALL meaningfully into their pedagogy.

The effectiveness of gamified MALL can be attributed to its foundation in psychological and cognitive learning theories. Self-Determination Theory (Deci & Ryan, 2000) explains that gamification satisfies learners' intrinsic needs for autonomy, competence, and relatedness, thereby increasing persistence and motivation. Cognitive Theory of Multimedia Learning (Mayer, 2001) further supports that multimedia-based interactions combining visual, auditory, and kinesthetic input enhance memory retention. In this study, learners experienced higher engagement because gamified features triggered emotional involvement alongside cognitive processing.

The Indonesian educational context also plays a role in amplifying these effects. Learners' high familiarity with mobile devices and social interaction through gamified features contributed to sustained participation. The novelty of learning English through mobile games, as opposed to traditional rote methods, provided a sense of innovation and enjoyment. This blend of novelty, interactivity, and social reinforcement explains why the experimental group demonstrated greater vocabulary gains and motivation compared to the control group.

The findings call for continued exploration of MALL as a core component of language education in Indonesia. Future studies should extend beyond vocabulary learning to examine grammar, pronunciation, and communicative competence using mobile gamified tools. Longitudinal research is needed to evaluate the durability of learning outcomes and the evolution of learner motivation over time. Integrating mixed methods will remain vital to understanding how emotional and behavioral engagement sustain language acquisition in digital contexts.

Pedagogically, the next step involves institutionalizing MALL practices through curriculum redesign, teacher professional development, and the creation of localized applications that reflect Indonesian linguistic and cultural contexts. Collaboration between educators, app developers, and linguists could generate adaptive gamified learning systems responsive to students' proficiency levels. The current study thus serves as an empirical foundation for future innovations in technology-enhanced language education, reinforcing that digital gamification, when thoughtfully applied, can transform EFL learning into an engaging, effective, and empowering experience.

## CONCLUSION

The study identified that gamified Mobile-Assisted Language Learning (MALL) applications significantly enhanced both vocabulary acquisition and learner motivation among Indonesian EFL students. Unlike previous studies that focused primarily on cognitive outcomes, this research emphasized the intersection between linguistic achievement and affective engagement, demonstrating that gamification elements such as reward systems, leaderboards, and adaptive challenges serve as dual catalysts for learning efficiency and enjoyment. The results revealed a

strong correlation between motivation levels and vocabulary gains, indicating that emotional engagement is not a by-product but a key driver of effective language learning through mobile technology.

The contribution of this study lies in its methodological innovation and conceptual synthesis. Methodologically, it integrates a quasi-experimental design with mixed methods quantitative analysis of vocabulary scores and qualitative exploration of learner experiences to construct a comprehensive picture of how gamified features influence learning. Conceptually, it bridges Self-Determination Theory and Cognitive Theory of Multimedia Learning within the MALL framework, illustrating how intrinsic motivation and multimedia engagement converge to improve vocabulary retention. This dual alignment enriches the theoretical landscape of digital language pedagogy by providing an empirically tested model for gamified learning that can be replicated in similar educational contexts. The study's methodological rigor and theoretical integration thus offer a replicable and scalable model for future MALL-based interventions.

The study acknowledges several limitations that warrant further investigation. The relatively short duration of the intervention limits the ability to generalize findings on long-term vocabulary retention and sustained motivation. The sample size, although adequate for statistical inference, represents only one regional context, suggesting the need for broader cross-institutional validation. Variations in learners' digital literacy and access to stable internet connections may have influenced the consistency of engagement levels across participants. Future research should adopt longitudinal designs to examine the durability of learning effects, incorporate adaptive gamification models that respond to learner profiles, and explore comparative studies across linguistic skills such as listening, speaking, and grammar.

## AUTHORS' CONTRIBUTION

Author 1: Conceptualization; Project administration; Validation; Writing - review and editing.
Author 2: Conceptualization; Data curation; In-vestigation.
Author 3: Data curation; Investigation.

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