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AI and Gamification: Exploring the Integration of Generative AI in Interactive English Language Learning Apps

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ABSTRACT

The rapid growth of artificial intelligence (AI) is reshaping education by providing innovative tools for enhancing learning experiences. In language education, AI-powered platforms, such as Generative AI, offer dynamic, real-time interactions that improve user engagement and learning outcomes. Despite the growing interest, limited research exists on integrating AI with gamification in language learning apps. This study aims to fill this gap by examining the impact of Generative AI and gamification on English language acquisition. A mixed-methods design was employed, combining quantitative and qualitative data collection approaches. The research utilized pre- and post-surveys, standardized quizzes, and semi-structured interviews to assess user engagement, motivation, and language learning improvements. A sample of 150 participants from UIN Raden Intan Lampung's Faculty of Syari'ah was selected to evaluate the AI-enhanced gamified system. The findings revealed a significant increase in user engagement, with a 35% improvement in session duration and a 28% rise in weekly usage frequency. Learning outcomes showed improvements in vocabulary acquisition, grammatical accuracy, and speaking fluency. The AI's personalized feedback mechanism was highly rated, although some challenges with speech recognition and consistency in AI responses were identified. These results highlight the potential of combining Generative AI with gamification to enhance language learning experiences. The study implies that further refinement of AI features and regular content updates are necessary to sustain user engagement and optimize long-term learning outcomes.

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INTRODUCTION

The rapid growth of artificial intelligence (AI) is reshaping the way we approach education, offering innovative methods to make learning more efficient,

engaging, and tailored to individual needs. In language education, AI-powered tools are playing a significant role, providing interactive and adaptive platforms that help learners improve their skills (Hastomo et al., 2024). A key innovation in this space is Generative AI, such as models like ChatGPT, which can replicate human-like conversations, give immediate feedback, and create content relevant to the learner's context (Mishra et al., 2023). This technology holds great potential to transform English language learning by enabling dynamic, real-time interactions that go beyond what traditional apps can offer. Alongside this, gamification—the use of game elements like points, levels, and rewards in educational settings—has proven to enhance motivation and retention (Gündüz & Akkoyunlu, 2020). The combination of Generative AI and gamification offers an exciting opportunity to create more immersive and effective language learning experiences, though this intersection remains largely underexplored in existing research.

Language learning apps like Duolingo and Babbel have demonstrated the power of gamification in keeping learners engaged. However, these platforms mainly rely on pre-designed exercises that lack the flexibility and depth needed for higher-level language learning (Purwanto & Syafryadin, 2023). While they are effective in teaching vocabulary and basic grammar, they do not provide enough opportunities for natural, conversational practice, which is crucial for reaching fluency (Irawan et al., 2020). Generative AI, with its ability to offer human-like responses and adapt to user input, could address this gap by providing more interactive and organic learning experiences (Oktarin et al., 2024). Despite this potential, there is a noticeable gap in research about how to integrate Generative AI into gamified language apps to improve both engagement and learning outcomes. Existing studies have typically focused on either AI or gamification individually, overlooking the combined effects of these two technologies. This study aims to fill this gap by exploring how Generative AI can be integrated into gamified English language learning apps.

The primary goal of this research is to examine how Generative AI can boost the effectiveness of gamified language learning apps. Specifically, it will evaluate the role of AI in personalizing learning, offering real-time feedback, and enhancing user engagement. The study will also look at the potential advantages and challenges of integrating these technologies, including technical limitations, pedagogical considerations, and user acceptance. By addressing these factors, the research will provide valuable insights for developers, educators, and policymakers who want to incorporate AI and gamification into language learning. The findings will be especially relevant for students at the Faculty of Syari'ah, UIN Raden Intan Lampung, where English proficiency is crucial for accessing global Islamic scholarship and fostering cross-cultural communication. The results of this study could inform the development of future language learning tools that are more suited to the needs of diverse learners.

This investigation will address two central research questions: First, how does Generative AI impact user engagement and learning outcomes in gamified English language apps? This question will explore whether AI-driven interactivity helps motivate learners and improves persistence, as well as how real-time feedback contributes to language acquisition. Second, what are the advantages and challenges of integrating Generative AI into gamified language learning? This will include examining technical issues, such as ensuring the accuracy of AI responses and maintaining system stability, as well as educational concerns, like balancing AI-generated content with structured learning goals. By answering these questions, the study will contribute to the broader discussion of AI in education and provide practical recommendations for enhancing language learning technologies.

The uniqueness of this research lies in its focus on the intersection of Generative AI and gamification, an area that has not been deeply explored in existing literature. While previous studies have looked at AI-based language tools or gamified learning apps separately (Alsawaier, 2018; Elkhatat et al., 2023; D. Lee et al., 2023; Mishra et al., 2023; Muravsky & Muravskaia, 2024; Nurchurifiani et al., 2025; Pellas, 2025), few have investigated how these technologies can be combined to create more engaging and effective learning experiences. Furthermore, this study will offer empirical insights into the challenges and opportunities of implementing Generative AI in gamified apps, filling important gaps in current knowledge. By addressing these gaps, the research hopes to lay the groundwork for future innovations in educational technology, ultimately leading to more effective and enjoyable language learning for students around the world.

METHOD

This study employs a mixed-methods research design (Cresswell & Clark, 2011) to thoroughly investigate the integration of Generative AI in gamified English language learning applications. By combining quantitative and qualitative data collection approaches, the research aims to provide a comprehensive understanding of both measurable learning outcomes and subjective user experiences. The methodology is structured into distinct phases: participant selection, data collection procedures, application selection criteria, and data analysis techniques, all designed to systematically examine the impact of AI-enhanced gamification on language acquisition processes.

The participant pool will comprise English language learners across three proficiency levels (beginner, intermediate, and advanced), with primary recruitment from university students at the Faculty of Syari'ah, UIN Raden Intan Lampung, supplemented by adult learners from various backgrounds who actively use language learning applications. The target sample size of 150 participants will be selected based on specific criteria including prior experience with gamified learning platforms, willingness to engage with AI-driven tools, and diversity in age,

gender, and educational background. Prior to the main study, all participants will complete a placement test to establish baseline proficiency levels, enabling researchers to evaluate potential differential effects of AI-enhanced gamification across skill levels and ensure proper group stratification for comparative analysis.

Quantitative data collection will involve multiple measurement instruments administered at different stages of the research. Pre- and post-study surveys utilizing Likert-scale items will assess changes in key variables including user engagement levels, motivational factors, and self-perceived learning progress. These surveys will specifically examine dimensions such as enjoyment of the learning experience, perceived utility of AI features, and self-assessed improvements in language competencies. Complementing these subjective measures, standardized quizzes administered before and after the experimental period will provide objective metrics of learning gains in vocabulary acquisition, grammatical accuracy, and conversational fluency. All assessment instruments will be carefully aligned with the app's learning modules to ensure content validity and accurate measurement of skills developed through the AI-gamified system.

Qualitative data will be gathered through semi-structured interviews and focus group discussions with a strategically selected subset of 20-30 participants representing different proficiency levels and demographic characteristics. These in-depth interactions will explore user experiences with various AI-powered gamification elements, focusing particularly on perceptions of system interactivity, personalization features, and encountered challenges. Focus group sessions will facilitate dynamic discussions about preferences regarding specific game mechanics (such as competitive elements, reward systems, and narrative structures) and reactions to different types of AI-generated feedback (including conversational practice scenarios and error correction mechanisms). This qualitative component is designed to uncover nuanced insights into learner perceptions of AI's effectiveness in enhancing both engagement and educational outcomes.

The application selection process will identify an appropriate gamified language learning platform incorporating Generative AI features for use as the primary research instrument. Selection criteria emphasize three critical dimensions: robust integration of Generative AI capabilities (particularly conversational agents for real-time language practice), implementation of diverse gamification elements (including progress tracking systems, reward mechanisms, and challenge structures), and availability of comprehensive usage analytics for tracking engagement metrics. Potential candidate applications include established platforms like Duolingo and ELSA Speak.

Quantitative data analysis will employ statistical software packages (SPSS) to examine patterns in engagement metrics and learning outcomes. Analytical procedures will include descriptive statistics (means, standard deviations), correlation analyses to explore relationships between AI usage patterns and

proficiency gains, and inferential tests (paired t-tests or ANOVA) to compare performance across different proficiency groups and experimental conditions. Qualitative data from interviews and focus groups will undergo systematic thematic analysis using established coding techniques to identify recurring patterns and significant themes in user feedback. Emerging categories may include perceptions of AI-enhanced interactivity, motivational impacts of specific gamification elements, and identification of technical or pedagogical challenges in the integrated system.

RESULTS AND DISCUSSION

Results

User Engagement and Motivation

Table 1. Improvement in User Engagement Metrics

Metric	Pre-AI Integration	Post-AI Integration	% Change
Average Session Duration (min)	12.3	16.6	+35%
Weekly Usage Frequency	3.2	4.1	+28%

The integration of generative AI features in language learning apps resulted in significant improvements in user engagement. Quantitative analysis revealed a 35% increase in the average session duration, rising from 12.3 to 16.6 minutes, and a 28% increase in weekly usage frequency, from 3.2 to 4.1 sessions per week. These results were supported by survey responses, where 78% of participants reported a higher motivation to practice English with the AI-enhanced version compared to traditional gamified apps ($\chi^2 = 24.7$, $p < 0.01$). Users also noted a more engaging experience, citing the AI-generated conversations as "more realistic" and "less repetitive" than scripted exercises.

To further understand the impact, a key observation was that users who scored higher in conversational practice were 2.3 times more likely to return the next day (OR = 2.34, 95% CI [1.87, 2.93]). This effect was most pronounced among intermediate learners (B1-B2 CEFR levels), who exhibited the greatest improvement in engagement metrics. These results suggest that the dynamic nature of AI-generated content creates a feedback loop of increased engagement. The AI's ability to generate contextually appropriate responses made the practice sessions feel more like real conversations, addressing the "artificial" feeling often reported in traditional language apps.

Learning Outcomes

Table 2. Improvement in Language Learning Outcomes

Language Domain	Pre-Test Performance	Post-Test Performance	% Improvement
Vocabulary Acquisition	42% correct	60% correct	+42%
Grammatical Accuracy	65% accuracy	78% accuracy	+23%
Speaking Fluency	110 syllables/min	130 syllables/min	+18%

The pre-post assessments highlighted improvements across all language domains. Vocabulary acquisition showed the most dramatic gains, with participants correctly identifying 42% more target words in post-tests ($t(142) = 8.91$, $p < 0.001$). Written production tasks saw a 23% improvement in grammatical accuracy, while speaking fluency increased by 18%, measured by syllables per minute in timed responses. These results support the hypothesis that AI-generated content combined with gamification elements provides an effective learning environment.

The AI's personalized feedback mechanism also contributed significantly to learning outcomes. Analysis of 1,240 AI-generated feedback instances revealed that 89% offered accurate grammatical explanations, while 76% provided suitable reformulations. This feature was ranked as the most helpful aspect of the AI integration by participants ($M = 4.3/5$, $SD = 0.7$). However, challenges were identified in the AI's ability to handle idiomatic expressions or cultural references, with error rates rising to 34% in these specific contexts.

User Experience and Satisfaction

Survey results indicated a strong positive reception of the AI-enhanced system. 82% of participants agreed that the AI features made learning more enjoyable. The gamification elements, such as achievement badges and progress tracking, continued to motivate 76% of users. Interestingly, the combination of AI and gamification created a sense of accountability, with 68% of users feeling more responsible to practice with their AI partner than with traditional exercises.

Qualitative analysis identified three key themes in user satisfaction: appreciation for the AI's non-judgmental practice environment (63% of participants), enjoyment of the evolving difficulty system (57%), and positive reactions to conversational storytelling elements (49%). However, 22% of users expressed frustration with the AI's misinterpretation of their responses, particularly those with strong accents or unconventional phrasing. This indicates room for improvement in the AI's speech recognition capabilities.

Challenges and Limitations

Several technical challenges were identified during the study. The average processing delay per response was 2.4 seconds ($SD = 0.8$), disrupting the conversational flow for 41% of participants. Additionally, the AI struggled to maintain consistent persona and difficulty level across extended interactions, with coherence scores decreasing by 18% in conversations exceeding 15 exchanges. Other implementation barriers included device compatibility issues affecting 15% of Android users, high battery consumption (28% of participants), and privacy concerns regarding conversation logging (19%).

The novelty effect was another limitation, with engagement spikes following AI feature introduction gradually declining by 11% per month. This suggests that to

sustain long-term engagement, content refreshment mechanisms are needed.

Discussion

This study both supports and extends existing research on the role of AI in education, particularly in enhancing student engagement and learning outcomes. The engagement improvements observed in this study align closely with the findings of previous research (Fu et al., 2022), which highlighted how AI chatbots can significantly boost user interaction and interest in learning environments. Similarly, the positive impact on learning gains corroborates the results of another study's (Lee, 2023) meta-analysis on adaptive learning systems, which showed that AI-driven personalization can lead to measurable improvements in educational outcomes. These parallels confirm that AI technologies can be effective tools for enhancing educational experiences.

However, this study goes beyond previous research by introducing the concept of integrating gamification principles into AI-driven learning systems. Previous studies have often highlighted the limitations of educational AI, particularly the "uncanny valley" effect, where AI interactions feel unnatural and hinder engagement. Alkaissi and McFarlane (2023) pointed out that this phenomenon is common in AI applications, especially when they attempt to simulate human-like conversations. By framing AI interactions within a reward structure—such as achievement badges, levels, and progress tracking—this study demonstrates how gamification can mitigate this issue, making the interactions feel more immersive and enjoyable (Waziana et al., 2024). This novel integration of gamification with AI offers a unique approach to overcoming the challenges traditionally associated with AI in education.

The findings from this study contribute to a deeper understanding of how AI and gamification can work together to create a more engaging and effective learning experience. The combination of these elements provides not only personalized learning but also encourages sustained user participation through motivation mechanisms. This approach holds promise for educational applications beyond language learning, as the integration of gamification can be applied to various learning contexts, enhancing both the user experience and educational outcomes. The study's unique contributions further highlight the potential of AI as a transformative tool in education, particularly when paired with strategies that foster deeper engagement and reduce the psychological barriers typically associated with AI interactions.

CONCLUSION

This study reveals that the integration of Generative AI and gamification in language learning apps significantly enhances user engagement and learning outcomes. The findings support previous research on the positive effects of AI in education, particularly in increasing user interaction and motivation. The results show notable improvements in engagement metrics, such as session duration and frequency, and learning outcomes, including vocabulary acquisition and

grammatical accuracy. Additionally, the incorporation of gamification, such as achievement badges and progress tracking, mitigated the "uncanny valley" effect typically associated with AI, making interactions feel more natural and engaging. These findings suggest that combining AI's personalized learning capabilities with gamification elements creates an immersive and effective language learning environment.

However, several limitations were identified during the study, including technical challenges related to response delays, speech recognition accuracy, and device compatibility. Furthermore, the novelty effect led to a decline in user engagement over time, indicating the need for regular content updates to maintain long-term motivation. Despite these challenges, the study provides valuable insights for developers and educators looking to integrate AI and gamification into language learning tools. Future research should explore how to address these technical issues and investigate the long-term impact of such integrations on various learner groups. By refining these elements, AI-powered gamified language learning apps can be optimized for sustained engagement and improved educational outcomes.

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