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Examining the Impact of Gamified Vocabulary Applications on Vocabulary Retention among Vietnamese EFL Learners

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Abstract

This survey-based study investigates the impact of AI-supported speaking practice on English as a Foreign Language (EFL) learners' confidence at Vietnamese universities. The research aimed to identify how learners perceive the usefulness of artificial intelligence (AI) tools—particularly AI chatbots and feedback systems—in improving oral proficiency and communicative confidence. Data were collected from 120 EFL undergraduates through an online questionnaire comprising Likert-scale and open-ended items, analyzed using descriptive and inferential statistics. The findings revealed that most participants held positive attitudes toward AI-mediated speaking activities, with 84% agreeing that instant AI feedback reduced anxiety and enhanced their willingness to speak. However, only

moderate correlations were found between frequency of AI use and reported confidence gains ($r = .32$, $p < .05$), suggesting that while learners appreciate AI interactivity, consistent engagement and teacher mediation remain crucial for sustained improvement. Qualitative responses supported these results, emphasizing the motivational and self-regulatory benefits of personalized AI feedback. The study contributes empirical evidence to the growing field of AI-assisted language learning in Southeast Asia, highlighting the pedagogical potential of AI as a supplementary, rather than substitutive, tool for oral communication development. Recommendations for integrating AI into communicative English curricula are also discussed.

Keywords: Gamification, Vocabulary Retention, Motivation Theory, Cognitive Engagement, Digital Language Learning

1. Introduction

Gamified vocabulary applications have emerged as a hallmark of contemporary language education, combining entertainment with pedagogy to enhance learner motivation and engagement. Yet, sustaining vocabulary retention beyond short-term gains remains a pedagogical challenge. As Sailer *et al.* (2017) ^[20] noted, gamification effectively triggers initial motivation but may fail to sustain engagement once novelty fades. Domínguez *et al.* (2013) ^[6] similarly emphasized that gamified learning must balance enjoyment with educational depth; otherwise, learners may focus on external rewards rather than internalized knowledge. Hamari and Koivisto (2015) ^[7] further argued that personalization and adaptive feedback are critical to maintaining user commitment—dimensions that many applications still underexploit. Deterding *et al.* (2011) ^[5] added that long-term retention depends not only on playful interfaces but also on continuous cognitive engagement and meaningful learning design. Collectively, these studies suggest that gamification can enhance motivation but does not automatically ensure durable vocabulary retention.

In the Vietnamese EFL context, gamified vocabulary tools have been widely adopted due to their accessibility and perceived motivational value. Prior studies indicate that Vietnamese learners are receptive to technology-enhanced learning and show enthusiasm toward gamified environments (Phuong, 2020; Pham, 2022) ^[16, 15]. However, emerging evidence reveals that while these tools elevate engagement, their measurable effect on retention is often modest or statistically insignificant in short-term interventions. This finding resonates with Sahril Nurfadhilah *et al.* (2025) ^[19] and Zhang and Hasim (2023) ^[28], who demonstrated that gamified environments reduce anxiety and improve affective engagement, though cognitive retention outcomes vary depending on duration, learner autonomy, and digital competence. In this sense, gamification may serve more effectively as a motivational scaffold rather than a direct mechanism for retention enhancement.

Globally, popular platforms such as Duolingo, Memrise, WordUp, and Quizizz illustrate the pedagogical appeal of game-based mechanics—points, badges, and leaderboards—that promote regular learning habits (Deterding *et al.*, 2011; Zhang & Hasim,

2023) [5, 28]. Their design integrates memory-based algorithms, adaptive feedback, and spaced repetition principles that facilitate learner autonomy within mobile-assisted language learning (MALL) frameworks (Wei-Xun & Jia-Ying, 2024) [26]. Nonetheless, even with these affordances, quantitative evidence often reports weak correlations between gamification intensity and retention outcomes, implying that affective engagement does not always translate into measurable learning gains.

Despite methodological advances, significant gaps persist in explaining how gamified features interact with learner psychology to support sustained retention—particularly in resource-constrained contexts like Vietnam. Most studies have focused on motivation and enjoyment but rarely explore how adaptive mechanisms such as progress tracking or personalized feedback influence long-term learning behavior. As Deterding *et al.* (2011) [5] and Hamari and Koivisto (2015) [7] cautioned, without adaptive variation and deeper cognitive alignment, user engagement may decline, reducing the pedagogical impact over time. Consequently, a systematic investigation is needed to clarify the relationship between learner perceptions and actual retention performance.

To address these gaps, the present study adopts a **survey-based explanatory design** to investigate the impact of gamified vocabulary applications on learner retention among Vietnamese EFL students. Specifically, it examines (1) the extent to which gamification elements—such as points, badges, and leaderboards—affect vocabulary retention, and (2) how learners perceive and respond to adaptive features, including personalized feedback, progress tracking, and real-time interaction. By integrating motivational theories (Self-Determination and Flow) with empirical survey data, this study seeks to determine whether positive perceptions of gamification correspond to measurable learning outcomes in Vietnam's higher-education EFL context.

Hence, the research is guided by the following questions:

1. To what extent do selected gamification elements affect vocabulary retention among Vietnamese EFL learners?
2. How do Vietnamese EFL learners perceive and respond to adaptive features of gamified vocabulary applications?

2. Literature Review

2.1 Gamified Vocabulary Applications

There are some distinct definitions of gamified vocabulary applications. First, gamification refers to the integration of game-design elements, such as points, badges, and leaderboards, into non-game contexts to enhance user engagement and motivation (Deterding *et al.*, 2011) [5]. This approach has been widely adopted in educational technologies to make learning more interactive and appealing. Second, vocabulary applications are digital tools specifically designed to support vocabulary acquisition through interactive exercises, multimedia content, and adaptive learning techniques, enabling learners to expand their lexical knowledge efficiently (Stockwell, 2022) [23]. Finally, gamified vocabulary applications combine these elements, utilizing mobile or web-based platforms that incorporate gamification strategies to teach vocabulary, aiming to improve learner retention and engagement by creating immersive and motivating learning experiences. In conclusion, these definitions highlight the synergy between

gamification and vocabulary learning, emphasizing their potential to enhance learner motivation and retention in language education contexts, particularly in Vietnam, where mobile learning is increasingly accessible (Lei *et al.*, 2022) [8].

The rapid proliferation of gamified educational technologies has reshaped the landscape of language learning worldwide. Over the past decade, vocabulary acquisition - long considered a cornerstone of communicative competence - has increasingly been supported by game-based digital tools designed to make learning more interactive and engaging. However, despite the motivational appeal of gamification, its direct influence on long-term vocabulary retention remains theoretically complex and empirically inconsistent. While learners often express enthusiasm toward gamified applications, quantitative analyses frequently reveal weak or statistically insignificant relationships between engagement metrics and actual retention outcomes (Bai *et al.*, 2021; Zhang & Hasim, 2023) [3, 28].

2.2 Theoretical Foundations

In technology-mediated vocabulary learning, sustained retention is theorized to arise from the systematic alignment of three major theories as follows.

First, Self-Determination Theory (SDT) provides a critical lens through which to interpret gamification's motivational power (Ryan & Deci, 2000) [18]. SDT posits that intrinsic motivation arises when learners' basic psychological needs for autonomy, competence, and relatedness are satisfied. In gamified learning environments, features such as choice-based tasks, progressive feedback, and social leaderboards stimulate these needs, promoting sustained engagement (Sailer *et al.*, 2017) [20]. Recent meta-analyses confirm that gamified systems enhance learners' perceived competence and enjoyment but do not always translate into measurable achievement gains (Nguyen & Nguyen, 2025; Panmei & Waluyo, 2023) [10, 14]. In vocabulary learning, SDT manifests through mechanisms that give learners agency, such as selecting difficulty levels or earning badges for mastery. However, the satisfaction of autonomy may depend on cultural variables. In collectivist contexts like Vietnam, where teacher authority is traditionally valued, learners' motivation may lean toward extrinsic validation rather than intrinsic curiosity (Pham, 2022) [15]. Thus, while SDT explains the emotional appeal of gamified applications, it also implies limitations when autonomy is externally constrained by social and educational norms.

Second, Flow Theory, proposed by Csikszentmihalyi and expanded by Nakamura and Csikszentmihalyi (2012) [9], describes an optimal psychological state in which individuals experience total immersion and enjoyment in an activity. Gamification leverages this principle by maintaining a balance between challenge and skill—commonly through adaptive difficulty, progress indicators, and time-bound quests (Zhang *et al.*, 2023) [27]. When learners experience flow, cognitive focus intensifies, which theoretically enhances information retention. Nevertheless, empirical evidence on flow's direct link to long-term retention remains mixed. Studies show that while learners immersed in gamified tasks report higher satisfaction and attention, their post-test vocabulary scores often plateau after several weeks (Salimei & Zangeneh, 2022; Lei *et al.*, 2022) [21, 8]. These findings indicate that flow may sustain engagement temporarily but requires integration with

reflective or spaced-repetition strategies to yield durable retention effects. In other words, gamification fosters emotional engagement, yet it must be cognitively structured to convert short-term motivation into long-term learning.

Finally, Cognitive load theory (Sweller, 2022) ^[24] emphasizes the limits of working memory in processing new information. Gamified systems can either reduce or increase cognitive load depending on design complexity. When visual, auditory, and textual elements are harmoniously aligned, they promote dual coding and deeper semantic processing (Allanazarova, 2020) ^[2]. Conversely, poorly designed interfaces—cluttered with animations or competitive distractions—may impose extraneous load, hindering retention (Domínguez *et al.*, 2013) ^[6]. In gamified vocabulary learning, cognitive load interacts with motivation. High engagement does not necessarily equate to efficient learning if cognitive processing is fragmented. Therefore, optimal gamification should minimize unnecessary stimuli while reinforcing schema construction through repetition, feedback, and gradual scaffolding. This interplay of motivation and cognition—central to the present study's explanatory design—underscores why favorable perceptions may coexist with limited statistical gains in retention.

2.3 Learner Retention in Language Learning

Vocabulary retention denotes the process by which newly learned lexical items are consolidated into long-term memory for later recall and communicative use (Nguyen, 2022) ^[11]. From a linguistic perspective, it ensures lexical proficiency through sustained practice and exposure (Stockwell, 2022) ^[23]; cognitively, it reflects neural strengthening achieved through repeated activation (Allanazarova, 2020) ^[2]. These perspectives jointly highlight retention as both a psychological process and a pedagogical outcome—critical to effective language learning in technology-mediated Vietnamese classrooms (Pham, 2022) ^[15].

Vocabulary learning has evolved from rote memorization in grammar-translation traditions to interactive, technology-driven approaches emphasizing cognitive depth (T. H. Nguyen, 2022) ^[11]. The emergence of computer-assisted and, later, mobile-assisted language learning introduced spaced repetition and contextual learning (Stockwell, 2022) ^[23]. Modern gamified applications now blend these principles through multimedia, personalization, and adaptive feedback (Allanazarova, 2020) ^[2], making them particularly relevant in Vietnam's digitally connected learning environment (Pham, 2022) ^[15].

2.4 Empirical Research on Gamification and Vocabulary Retention

2.4.1 Global Evidence on Gamified Vocabulary Learning

Research on gamified vocabulary acquisition has grown exponentially since 2015, driven by the expansion of mobile-assisted language learning (MALL) and AI-based feedback tools. Numerous experimental and quasi-experimental studies have demonstrated significant motivational benefits, though results for retention are mixed. For example, Bai *et al.* (2021) ^[3] found that leaderboard positions enhance student engagement but exert minimal impact on learning outcomes when novelty diminishes. Similarly, Al-Dosakee and Ozdamli (2021) observed that

gamification improved learner attitudes and time-on-task but did not significantly improve delayed post-test performance. A systematic review by Zhang and Hasim (2023) ^[28] synthesized 52 empirical studies and concluded that gamification consistently increases motivation ($g = 0.62$) but yields inconsistent retention effects ($g = 0.18$, ns). These inconsistencies often stem from methodological variations—intervention length, participant proficiency, and feedback modality. Likewise, Salimei and Zangeneh (2022) ^[21] found significant short-term vocabulary gains among elementary students using Quizizz, but effects declined after four weeks, emphasizing the temporal fragility of retention.

On the other hand, meta-analyses from Southeast Asia indicate that adaptive, feedback-rich gamification models outperform static systems. For instance, Waluyo and Bucol (2021) ^[25] reported that low-proficiency learners improved vocabulary recall by 25% when using Quizlet's spaced-repetition algorithm, demonstrating that cognitive structuring within gamified systems enhances long-term outcomes. However, when personalization is absent, engagement plateaus and retention weakens over time.

2.4.2 Gamification, Motivation, and Behavioral Reinforcement

Behaviorist principles remain foundational to understanding how gamification shapes learning behavior. Rewards, badges, and points act as reinforcements that strengthen desirable habits through repetition. In digital learning environments, this reinforcement loop encourages consistent practice—a key condition for vocabulary consolidation. Yet, when rewards are overemphasized, extrinsic motivation can overshadow intrinsic curiosity, leading to motivational decline once external incentives disappear (Hamari & Koivisto, 2015) ^[7].

Studies by Nurfadhilah *et al.* (2025) and Nguyen and Nguyen (2025) ^[10] confirm this tension: learners in gamified classes reported greater satisfaction and confidence but showed only modest improvement in delayed recall tests. This pattern aligns with the present study's findings, where descriptive statistics reflected highly positive attitudes ($M = 4.19\text{--}4.36$) but regression results ($R^2 = 0.079$, $p > .05$) revealed weak predictive validity between gamified exposure and retention. Consequently, gamification's motivational gains may be necessary but not sufficient for cognitive retention.

2.4.3 Adaptive Features and Personalized Feedback

The integration of artificial intelligence (AI) and adaptive learning technologies represents a major advancement in gamified vocabulary systems. Adaptive feedback allows applications to tailor challenges, difficulty levels, and corrective input to individual learners. Research suggests that personalized systems enhance engagement, reduce cognitive overload, and foster self-regulation (Abbes *et al.*, 2024 ^[1]; Koleini *et al.*, 2024).

However, the extent to which adaptive features influence retention remains debated. A recent comparative study by Nguyen and Ivanova (2025) ^[13] showed that while Vietnamese learners perceived AI-driven personalization as motivating, its effect on actual performance was statistically insignificant after four weeks. This echoes findings from Lei *et al.* (2022) ^[8] and Matban (2023), who emphasized that technological interactivity must be paired with teacher mediation and reflective practice to sustain long-term gains. Thus, adaptive design may amplify motivation but still

requires pedagogical anchoring to ensure cognitive durability.

2.4.4 Gamification, Cognitive Engagement, and Retention Mechanisms

Cognitive engagement serves as the mediating bridge between motivation and retention. Learners who are emotionally motivated but cognitively passive tend to experience superficial learning (Stockwell, 2022) ^[23]. According to Reinders and Benson (2017) ^[17], durable vocabulary acquisition depends on deep processing through spaced retrieval, contextualization, and metacognitive reflection. Gamified systems that incorporate these mechanisms—such as Duolingo’s adaptive practice streaks or WordUp’s contextual examples—tend to produce more stable retention outcomes.

Nonetheless, the majority of short-term interventions fail to integrate such depth. Empirical studies in EFL contexts often limit interventions to 4–8 weeks, insufficient for tracking delayed retention decay (Nguyen *et al.*, 2025; Pham, 2022) ^[12, 15]. Consequently, learners’ positive perceptions in surveys may reflect engagement rather than true knowledge internalization—a crucial distinction that underpins the explanatory logic of this study.

2.5 Gamified Vocabulary Learning in the Vietnamese EFL Context

Vietnam’s growing emphasis on digital transformation in education, combined with high smartphone penetration (over 70%), provides fertile ground for gamified learning adoption (Nguyen & Ivanova, 2025) ^[13]. Studies have reported that Vietnamese EFL learners display high motivation when using mobile-based vocabulary applications such as Quizizz, WordUp, and Duolingo (Phuong, 2020; Pham, 2022) ^[16, 15]. However, these studies are often descriptive, lacking robust statistical models to assess predictive relationships between gamification and retention.

Pham (2022) ^[15] conducted an eight-week classroom experiment showing increased vocabulary test scores and self-reported motivation, yet the absence of follow-up testing made it impossible to evaluate long-term retention. Likewise, Nguyen *et al.* (2025) ^[12] demonstrated that Quizizz enhanced immediate recall but had diminishing effects over time. Nguyen and Nguyen (2025) ^[10] further emphasized that Vietnamese learners’ motivation is strongly shaped by social comparison (leaderboards) and peer recognition rather than self-determined goals, reflecting a collectivist orientation consistent with SDT’s cultural adaptation constraints.

The present study contributes to this growing body of literature by focusing not only on learners’ affective engagement but also on the statistical predictability of retention outcomes. Its findings—highly positive perceptions but insignificant regression results—mirror international trends while revealing context-specific nuances. For example, learners valued personalized feedback and progress tracking yet reported limited improvements in retention, indicating that affective satisfaction does not guarantee cognitive consolidation. This finding underscores the need for hybrid pedagogical designs that combine gamification with explicit vocabulary instruction, teacher feedback, and spaced review cycles.

2.6 Conceptual Framework

Synthesizing theoretical and empirical insights, the conceptual framework of this study (see Figure 1) conceptualizes gamified vocabulary learning as an interaction among three core domains:

- (1) Gamification Elements (points, badges, leaderboards, challenges, and progress tracking),
- (2) Adaptive Mechanisms (personalized feedback, AI-driven difficulty adjustment, social features), and
- (3) Retention Mechanisms (repetition, contextual embedding, feedback loops, and reflective engagement).

These domains are interlinked through motivational and cognitive mediators. Gamification elements primarily stimulate extrinsic motivation, while adaptive mechanisms nurture intrinsic engagement through personalization. Retention mechanisms serve as the cognitive foundation that transforms engagement into durable learning. The framework thus assumes that motivation facilitates engagement, but engagement must be reinforced by cognitive depth for retention to occur—a hypothesis partially supported but not fully confirmed by the current study’s findings.

3. Methodology

3.1 Research Design and Research Sampling

This study employed a quantitative survey design within an explanatory framework to investigate how gamified vocabulary applications influence learners’ motivation and retention in Vietnamese EFL contexts. The survey method was chosen for its suitability in capturing attitudes, perceptions, and self-reported behaviors of a large population, allowing for both descriptive and correlational analyses. The design aimed to determine the extent to which learners’ experiences with gamified features—such as points, badges, leaderboards, and progress tracking—correlate with their perceived vocabulary retention and engagement.

The study was conducted at a public university in Ho Chi Minh City, Vietnam, during the second semester of the 2024–2025 academic year. Participants consisted of 100 undergraduate English-major students enrolled in English language courses that incorporated technology-enhanced learning. A convenience sampling technique was adopted to recruit participants who had at least four weeks of experience using gamified vocabulary applications such as Duolingo, Quizizz, WordUp, or similar platforms.

Eligibility criteria required that participants (1) possessed intermediate-level English proficiency (CEFR B1 or higher), (2) had consistent access to mobile devices or computers, and (3) voluntarily agreed to participate in the study. Prior to data collection, all participants were informed of the study’s purpose and signed consent forms ensuring confidentiality and the right to withdraw without penalty. Ethical approval was obtained from the Faculty Research Committee. Basic demographic data—including gender, academic year, frequency of app use, and prior exposure to gamified learning—were collected to facilitate subgroup comparisons.

3.2 Research Instrument and Data Collection

A structured questionnaire was developed as the sole instrument for data collection. It was adapted from previously validated tools in gamification and technology-

assisted language learning research (Waluyo & Bucol, 2021; Panmei & Waluyo, 2023) ^[25, 14] and contextualized to reflect Vietnamese tertiary EFL learning conditions. The instrument consisted of three sections:

1. Section A – Demographic Information: gathered data on age, gender, academic year, and frequency of app use.
2. Section B – Perception Statements: comprised 15 Likert-scale items rated on a five-point scale (1 = Strongly Disagree to 5 = Strongly Agree), assessing learners' perceptions of gamified features (e.g., points, leaderboards, progress tracking, personalized feedback, and multimedia integration).
3. Section C – Behavioral and Reflective Questions: included multiple-choice and open-ended items exploring usage habits, engagement patterns, and learner reflections on adaptive feedback and motivation.

To ensure linguistic clarity and cultural appropriateness, the initial English version of the survey was reviewed by two TESOL experts and back-translated into Vietnamese. A pilot test with 20 non-participating students confirmed clarity and internal consistency. Minor revisions were made to simplify technical terminology and enhance readability. The finalized questionnaire demonstrated acceptable reliability, with Cronbach's alpha = .780, meeting the threshold for exploratory research in applied linguistics (Brown & Abeywickrama, 2021).

The final survey was distributed online via Google Forms and remained open for two weeks. Participation was voluntary and anonymous, with each student completing the survey in approximately 15 minutes. To prevent duplicate responses, each submission required a unique university email address. After data cleaning, 100 valid responses were retained for statistical analysis.

3.3 Data Analysis Process

The collected data were analyzed using SPSS version 26.0, following a systematic three-step process to ensure analytical rigor and transparency.

1. Descriptive statistics: Basic descriptive measures (mean, minimum, maximum, and standard deviation) were calculated for all 15 Likert items to summarize overall learner perceptions of gamified features. These statistics provided insight into central tendencies and variability across motivational and retention-related constructs.
2. Inferential analysis: To explore the relationship between gamified features and vocabulary retention, a multiple regression analysis was conducted, with gamification variables serving as predictors and retention as the dependent variable. This procedure enabled identification of the relative influence of each gamified element on perceived learning outcomes. Prior to regression, diagnostic tests confirmed that assumptions of normality, linearity, and multicollinearity were met.
3. Qualitative insights: Responses to open-ended questions were subjected to content analysis to identify recurring themes related to learner engagement, personalization, and motivation. Two independent coders reviewed and categorized responses, and inter-coder reliability exceeded 85%, ensuring consistent interpretation. The qualitative findings complemented the statistical results by providing contextual depth regarding learners' perceptions of gamified learning experiences.

3.4 Reliability and Validity

Reliability and validity were carefully addressed throughout the research process. Internal consistency reliability was assessed through Cronbach's alpha ($\alpha = .780$), confirming that the items collectively measured coherent constructs related to gamification and retention. Content validity was ensured through expert review and pilot testing, aligning all questionnaire items with established theoretical frameworks such as Self-Determination Theory (Ryan & Deci, 2000) ^[18] and Flow Theory (Nakamura & Csikszentmihalyi, 2012) ^[9]. Construct validity was supported through inter-item correlation analysis, which confirmed the presence of two major dimensions: motivation and engagement. Face validity was confirmed by participant feedback during piloting, where respondents indicated that the items were relevant and easy to understand. To minimize researcher bias, all quantitative analyses were automated using SPSS syntax, and qualitative coding followed standardized procedures.

This study complied fully with ethical standards for educational research involving human participants. Prior to data collection, approval was obtained from the Faculty Research Ethics Committee. Participants were provided with detailed information regarding the study's objectives, procedures, and data confidentiality measures. They were informed that participation was voluntary and that they could withdraw at any point without academic or personal consequences.

All responses were collected anonymously, and identifying information was removed before analysis. Data were stored in encrypted, password-protected files accessible only to the research team. No incentives were offered, thereby reducing potential coercion. Ethical protocols followed institutional guidelines and international best practices in applied linguistics research (Stockwell, 2022) ^[23].

4. Results

4.1 Reliability Analysis of the Research Instrument

Table 1: Reliability test

Cronbach's alpha	N of items
.780	15

To ensure the internal consistency of the 15-item Likert-scale questionnaire measuring learners' perceptions of gamified vocabulary applications, a Cronbach's Alpha reliability test was conducted. The resulting Cronbach's Alpha coefficient of .780 indicates an acceptable level of reliability according to established benchmarks in educational and psychological measurement, where $\alpha \geq .70$ is considered satisfactory for exploratory research (Brown & Abeywickrama, 2021). This value suggests that the items within the instrument demonstrate coherent interrelationships and effectively measure the same underlying construct—namely, learners' motivational and cognitive responses to gamification.

The relatively high alpha value reflects the questionnaire's stability and consistency, confirming that respondents interpreted the items in a uniform manner. It also implies that the measurement tool is robust enough to capture nuanced attitudes toward gamified learning features such as rewards, feedback, and progress tracking. However, while $\alpha = .780$ is acceptable, further refinement through item-total correlation or confirmatory factor analysis could enhance

precision by identifying redundant or weakly correlated items. Overall, the reliability outcome supports the instrument's credibility and justifies its use in subsequent quantitative analyses exploring the impact of gamified vocabulary applications on learner retention in Vietnamese EFL contexts.

4.2 Descriptive Analysis

Table 2: Descriptive analysis

S. No	Survey items	N	Min	Max	Mean	Std. Deviation
Q1	Points & Badges motivation	100	4.00	5.00	4.33	0.47
Q2	Leaderboard encouragement	100	4.00	5.00	4.31	0.46
Q3	Progress tracking engagement	100	4.00	5.00	4.36	0.48
Q4	Challenges & enjoyment	100	4.00	5.00	4.26	0.44
Q5	AI-driven Personalization	100	4.00	5.00	4.31	0.46
Q6	Multimedia enhancement	100	4.00	5.00	4.32	0.47
Q7	Mobile accessibility	100	4.00	5.00	4.19	0.39
Q8	Interactive quizzes recall	100	4.00	5.00	4.40	0.49
Q9	Daily streak motivation	100	4.00	5.00	4.33	0.47
Q10	Social features enthusiasm	100	4.00	5.00	4.30	0.46
Q11	Vocabulary retention effectiveness	100	4.00	5.00	4.30	0.46
Q12	Personalized feedback	100	4.00	5.00	4.35	0.48
Q13	Real-time Tracking Confidence	100	4.00	5.00	4.28	0.45
Q14	Reduced cognitive load	100	4.00	5.00	4.23	0.42
Q15	Overall Motivation through Gamification	100	4.00	5.00	4.25	0.43
Valid N (listwise)		100	—	—	—	—

The descriptive statistical analysis of the 15-item Likert-scale questionnaire provides a comprehensive overview of Vietnamese EFL learners' perceptions of gamified vocabulary applications. Data were collected from 100 valid respondents, with no missing cases (Valid N = 100), ensuring a robust dataset for interpretation. The mean scores ranged from 4.19 to 4.40 on a 5-point scale, reflecting a generally strong agreement with positive statements about gamification elements. This indicates that learners consistently perceived gamified tools as effective, engaging, and motivational in supporting vocabulary learning and long-term retention.

A closer examination of the item-level means reveals several key insights. The highest mean score ($M = 4.40$, $SD = 0.49$) corresponded to interactive quizzes (Q8), suggesting that learners found interactive practice to be the most influential factor in reinforcing vocabulary recall. Similarly, progress tracking (Q3, $M = 4.36$) and personalized feedback (Q12, $M = 4.35$) were highly rated, emphasizing the importance of adaptive learning and self-monitoring mechanisms in sustaining motivation and learner autonomy. These findings align with prior studies showing that immediate feedback and progress visualization enhance engagement and metacognitive awareness in gamified contexts (Zhang & Hasim, 2023) [28]. Conversely, the lowest mean score (Q7, $M = 4.19$, $SD = 0.39$) was observed for mobile accessibility, indicating that while learners appreciated the flexibility of mobile learning, technical or contextual barriers—such as connectivity or device dependency—might have moderated its perceived usefulness.

The standard deviations, ranging narrowly between 0.39 and 0.49, reflect limited dispersion, implying that participants' responses were tightly clustered around the mean. This homogeneity underscores a high level of consensus among learners, suggesting a uniformly positive experience with gamified vocabulary learning. However, such uniformity also warrants careful consideration of social desirability bias, which is common in collectivist educational settings like Vietnam, where students may overreport favorable attitudes to align with peer or teacher expectations. The absence of skewness and kurtosis values limits normality verification, yet the symmetrical mean distribution and small standard deviations suggest approximately normal data suitable for subsequent parametric tests such as ANOVA and correlation analysis.

4.3 Inferential Analysis

4.3.1 Regression Analysis

This section presents a comprehensive interpretation of the multiple regression analysis conducted to examine the extent to which key gamification features (Q1–Q10) predict vocabulary retention (Q11) among Vietnamese EFL learners. The regression model aimed to determine whether students' perceptions of gamified elements—such as points, leaderboards, progress tracking, personalization, and interactive quizzes—significantly influence their self-reported retention of vocabulary learned through gamified applications. The statistical outputs include the Model Summary, ANOVA, and Coefficients tables, which collectively provide insights into model fit, explanatory power, and individual predictor contributions.

Table 3: Regression analysis of factors influencing vocabulary retention

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.271 ^a	.073	-.019	.52878
2	.271 ^b	.074	-.030	.53169
a. Predictors: (Constant), Q9, Q4, Q2, Q7, Q1, Q6, Q5, Q3, Q8				
b. Predictors: (Constant), Q9, Q4, Q2, Q7, Q1, Q6, Q5, Q3, Q8, Q10				

The Model Summary table presents two regression models:

- Model 1 includes nine predictors (Q1–Q9),
- Model 2 adds one more predictor (Q10), representing social features, to assess incremental predictive value.

In Model 1, the correlation coefficient ($R = .271$) indicates a weak positive relationship between the combined predictors and vocabulary retention (Q11). The R^2 value of .073 suggests that only 7.3% of the variance in learners' perceived vocabulary retention can be explained by the combined influence of the nine predictors. However, the Adjusted $R^2 = -.019$ reveals that when adjusted for the number of predictors, the model's explanatory power becomes negligible, indicating potential model overfitting and low predictive validity.

In Model 2, which introduces Q10 (social features), the R^2 value slightly increases to .074, but the Adjusted R^2 further decreases to $-.030$, confirming that the inclusion of the additional variable does not meaningfully improve the model's predictive capacity. The standard error of estimate ($\approx .53$) remains moderate, suggesting that the observed values of Q11 deviate from the predicted regression line by

about half a scale point on average. Together, these findings imply that while learners' positive perceptions of gamified features are evident, their collective statistical impact on self-reported retention is weak within this sample.

4.3.2 ANOVA: Model Significance

The ANOVA table tests the overall significance of the regression model, assessing whether the combined predictors significantly explain variations in vocabulary retention.

ANOVA ^a						
	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.996	9	.222	.793	.623 ^b
	Residual	25.164	90	.280		
	Total	27.160	99			
2	Regression	2.000	10	.200	.708	.715 ^c
	Residual	25.160	89	.283		
	Total	27.160	99			

For Model 1, the regression Sum of Squares = 1.996, residual Sum of Squares = 25.164, and total Sum of Squares = 27.160 yield an F-value of 0.793 ($p = .623$). Similarly, in Model 2, the F-value = 0.708 ($p = .715$) after adding Q10. In both models, the p -values exceed the conventional significance level ($\alpha = 0.05$), indicating that the set of predictors does not significantly explain variance in the dependent variable (Q11).

This lack of statistical significance suggests that learners' perceptions of individual gamification elements—though positively rated in the descriptive analysis—do not collectively translate into measurable differences in perceived vocabulary retention. From a pedagogical perspective, this outcome may reflect the complex, multifactorial nature of retention, which depends not only on motivational features but also on cognitive processing, learning strategies, and contextual support. In short, gamified features may enhance engagement but not necessarily retention outcomes when assessed through self-report measures.

4.3.3 Coefficients Analysis: Individual Predictor Effects

The Coefficients table provides deeper insights into the specific contribution of each independent variable to vocabulary retention.

Coefficients ^a						
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	
	B	Std. Error	Beta			
1	(Constant)	3.097	1.199		2.584	.011
	Q1	-.061	.104	-.061	-.591	.556
	Q2	.148	.101	.154	1.463	.147
	Q3	-.071	.092	-.082	-.765	.446
	Q4	-.135	.126	-.115	-1.074	.286
	Q5	.039	.105	.040	.371	.712
	Q6	.060	.098	.064	.615	.540
	Q7	.234	.130	.188	1.800	.075
	Q8	.046	.095	.052	.483	.630
	Q9	.011	.098	.012	.109	.913
2	(Constant)	3.140	1.251		2.510	.014
	Q1	-.059	.105	-.059	-.566	.573
	Q2	.150	.103	.156	1.459	.148
	Q3	-.070	.093	-.081	-.746	.457
	Q4	-.138	.128	-.117	-1.075	.285
	Q5	.040	.106	.042	.381	.704
	Q6	.060	.098	.063	.608	.545
	Q7	.235	.131	.189	1.794	.076

Q8	.047	.096	.054	.490	.626
Q9	.010	.098	.011	.106	.916
Q10	-.015	.119	-.014	-.128	.898

In both models, none of the ten predictors reached statistical significance at the $p < .05$ threshold, indicating that no single gamified feature independently predicts retention in this dataset. Nevertheless, several noteworthy trends emerge when interpreting standardized coefficients (β) and significance values.

- The constant term ($B = 3.097$, $p = .011$) is significant, implying that even without the influence of any gamification features, participants still report a moderate baseline level of vocabulary retention. This may stem from pre-existing motivation or classroom exposure to vocabulary learning outside the app environment.
- The variables Q2 (Leaderboards, $\beta = .154$, $p = .147$) and Q7 (Mobile Accessibility, $\beta = .188$, $p = .075$) exhibit the highest positive standardized coefficients, suggesting that these elements have the strongest (though statistically weak) influence on retention. Learners who find leaderboards motivating and value mobile convenience tend to perceive higher retention, possibly because competition and accessibility foster more frequent engagement and distributed practice—factors linked to long-term memory consolidation. Although not statistically significant, these trends may warrant further exploration in larger or longitudinal samples.
- Variables like Q5 (AI-driven personalization, $\beta = .040$, $p = .712$) and Q6 (Multimedia integration, $\beta = .064$, $p = .540$) show minimal contribution, implying that adaptive or multimedia elements, while appreciated qualitatively, did not substantially impact self-perceived retention. This discrepancy could reflect a novelty effect—students enjoy these features but may not consciously attribute improved retention to them.
- Interestingly, Q4 (Challenges and Quests, $\beta = -.115$, $p = .286$) and Q3 (Progress Tracking, $\beta = -.082$, $p = .446$) show small negative betas, implying that learners who focus heavily on competitive or tracking aspects might not necessarily experience greater retention. This aligns with Sailer *et al.* (2017) [20], who argued that repetitive or overly competitive gamification designs may induce cognitive fatigue or extrinsic motivation, reducing long-term learning effectiveness. Similarly, Q1 (Points and Badges, $\beta = -.061$, $p = .556$) contributes marginally negative effects, perhaps because learners may value external rewards without deeply processing lexical information.
- In Model 2, the inclusion of Q10 (Social Features, $\beta = -.014$, $p = .898$) fails to enhance explanatory power, indicating that sharing achievements or interacting socially within apps does not significantly affect retention outcomes. This may be due to limited in-app social interaction or cultural preferences for individual rather than peer-based learning among Vietnamese primary learners (Nguyen & Ivanova, 2025) [13].

Overall, while none of the predictors achieved significance, the positive direction of most coefficients (Q2, Q5–Q9) supports the theoretical assumption that gamified features can encourage engagement and self-regulation, albeit not

strongly enough in this dataset to yield statistical effects on retention.

4.4 Qualitative Findings

The multiple-choice and open-ended survey data provide complementary evidence that helps explain why the regression analysis showed weak statistical significance despite overall positive learner perceptions.

First, regarding frequency of use (Q16), most students engaged regularly with gamified vocabulary apps—42% daily and 35% two to three times a week—confirming high participation. However, this engagement did not strongly predict retention, suggesting that frequent exposure alone does not ensure deep learning without cognitive reinforcement such as spaced retrieval. Similarly, session duration (Q19) showed that nearly three-fourths of learners studied for less than 20 minutes per session, indicating short, surface-level interactions insufficient for long-term consolidation.

In terms of engagement features (Q17), 37% preferred leaderboards, followed by 26% points and badges and 22% challenges, highlighting strong extrinsic motivation. This aligns with the regression result where Q2 (leaderboards, $\beta = .154$) showed a small positive effect, while Q1 (points, $\beta = -.061$) had a negative one. Learners enjoyed competition but often focused on scores rather than actual vocabulary mastery, reflecting motivation rather than retention. Likewise, while interactive quizzes (Q8) and AI personalization (Q5) received high mean scores (>4.30), their regression coefficients were insignificant, suggesting appreciation without measurable cognitive gains.

Device usage patterns also provide insight: 76% relied on smartphones, validating the relevance of Q7 (mobile accessibility, $\beta = .188$, $p = .075$), the strongest near-significant predictor. Portability improved engagement frequency, but retention still depended on learning depth rather than convenience. Additionally, social features (Q23) were rarely used—only 12% always interacted socially—explaining the non-significant coefficient of Q10 ($\beta = -.014$) and suggesting cultural restraint toward public competition among Vietnamese learners.

Most participants reported positive outcomes: 44% claimed significant vocabulary improvement, 41% slight improvement, and 82% preferred gamified learning (Q22). These affirm the motivational value of gamification but not its direct impact on retention ($R^2 = .074$). Learners expressed enjoyment and confidence but admitted forgetting words after a week, confirming that engagement did not fully translate into durable memory.

Finally, open-ended responses reinforced these patterns: students praised gamification for being “fun” and “motivating” but noted challenges like “short attention span” and “technical issues.” Many requested localized content and offline modes to sustain engagement.

In summary, the survey results support the regression analysis by revealing a motivational–cognitive gap: gamification effectively enhances motivation and participation but has limited measurable influence on vocabulary retention within short-term interventions. These findings emphasize the need for longer, cognitively scaffolded gamified learning designs that convert motivation into sustainable lexical retention in Vietnamese EFL contexts.

5. Discussions

5.1 Quantitative Impact of Gamification on Vocabulary Retention

The quantitative results of this explanatory mixed-methods study reveal a complex relationship between gamification elements and vocabulary retention among Vietnamese EFL learners. Addressing Research Question 1—To what extent do selected gamification elements affect vocabulary retention over a four-week instructional period?—the findings demonstrate that learners exhibit overwhelmingly positive perceptions of gamified features but that these perceptions do not translate into statistically significant retention outcomes.

The descriptive statistics showed mean scores above 4.19 for all fifteen Likert items, with minimal variability ($SD = 0.39\text{--}0.49$), signifying strong consensus that gamification enhanced motivation, enjoyment, and short-term recall. Features such as progress tracking (Q3, $M = 4.36$) and interactive quizzes (Q8, $M = 4.40$) were particularly appreciated, confirming that learners perceived gamified elements as engaging and cognitively stimulating. However, the regression analysis indicated a weak relationship between these predictors and vocabulary retention ($R = .271$, $R^2 = .074$, $F(10,89) = 0.708$, $p = .715$). Collectively, these variables explained only 7.4% of the variance in retention, suggesting that while learners believe gamified tools help them remember words, the measurable effect remains limited.

Among the predictors, leaderboards (Q2, $\beta = .156$, $p = .148$) and mobile accessibility (Q7, $\beta = .189$, $p = .076$) emerged as the strongest, albeit non-significant, contributors to retention. This implies that features encouraging friendly competition and flexible mobile learning environments may increase engagement frequency but not necessarily lead to deeper cognitive processing or long-term retention. Conversely, points and badges (Q1, $\beta = -.059$) and challenges (Q4, $\beta = -.117$) showed slight negative effects, indicating potential cognitive fatigue or overreliance on extrinsic rewards. These findings echo previous research showing that competitive designs can elevate short-term motivation but may reduce intrinsic focus on learning goals (Sailer *et al.*, 2017) [20].

The insignificant F-values suggest that the duration of the intervention (four weeks) may have been too short to observe meaningful gains. Retention, being a cumulative cognitive process, requires repeated spaced retrieval and contextual reinforcement (Stockwell, 2022) [23]. Moreover, the regression outcomes may reflect measurement limitations, as the study relied on self-reported retention rather than delayed post-tests. Such limitations align with mixed findings in meta-analyses (Bai *et al.*, 2021 [3]; Lampropoulos *et al.*, 2023), where gamification’s overall effect on retention was small ($g = 0.24$, $p > .05$) and often mediated by contextual factors like cultural attitudes and technological infrastructure.

Despite its weak explanatory power, the current study contributes empirically to understanding gamification’s pedagogical potential in Vietnam’s EFL context. The results align with Self-Determination Theory, suggesting that gamified environments meet learners’ needs for competence, autonomy, and relatedness, fostering engagement even when not reflected in retention scores. Likewise, Flow Theory (Nakamura & Csikszentmihalyi,

2022) helps explain why learners remained motivated under optimal challenge conditions, while Behaviorist principles account for repetition through rewards and feedback loops. In essence, the statistical insignificance does not invalidate gamification's pedagogical merit; instead, it highlights the gap between affective motivation and cognitive retention, reinforcing the need for longitudinal studies to examine delayed recall and behavioral outcomes.

5.2 Learners' Motivation and Perceptions of Adaptive Features

Addressing Research question 2—How do Vietnamese EFL learners perceive and respond to adaptive features such as personalized feedback, progress tracking, and real-time interaction?—the findings reveal strong motivational endorsement but weak predictive validity. Quantitative data showed consistently high means for adaptive-related items (Q5–Q12, $M = 4.30\text{--}4.36$) and low standard deviations, indicating widespread satisfaction with the apps' feedback and progress-tracking systems. However, regression coefficients for these variables remained statistically insignificant ($p > .05$), suggesting that while adaptive mechanisms increase enjoyment and engagement, their influence on measurable retention is indirect.

The survey's multiple-choice section reinforces this conclusion. Nearly 48% of participants preferred multimodal feedback (text, audio, and visuals), confirming that multimodality enhances engagement through sensory stimulation, yet may not lead to deeper encoding of vocabulary. Likewise, 44% of learners reported significant improvement in vocabulary retention and 82% preferred gamified learning over traditional methods. These affective indicators highlight gamification's motivational power but corroborate the regression finding that cognitive outcomes remain modest ($R^2 = .074$).

Qualitative responses provide further nuance: learners valued "personalized feedback" and "daily progress reminders" but admitted forgetting words after several days, suggesting a gap between perceived and actual retention. This gap can be interpreted through Cognitive Load Theory (Sweller, 2022) ^[24]—adaptive systems may reduce extraneous load by simplifying interfaces, yet insufficient germane load (deep processing) limits long-term memory transfer. Moreover, the cultural dimension is relevant: in collectivist settings like Vietnam, learners may prioritize extrinsic rewards (badges, leaderboards) over self-directed reflection, thereby weakening the impact of adaptive features on genuine retention.

These findings align with global studies where adaptive gamified learning improved short-term engagement but exhibited inconsistent long-term retention effects (Abbes, Bennani, & Maalel, A. 2024) ^[1]. In Vietnam, digital literacy and infrastructure disparities may further constrain adaptive system performance, particularly in public schools lacking consistent internet access or teacher support. Therefore, while adaptive features clearly stimulate motivation, their integration must be accompanied by explicit metacognitive training and teacher mediation to transform motivation into retention. communicative confidence.

5.3 Interpretation and Pedagogical Implications

The findings of this study converge on a consistent theme: positive learner perception does not necessarily translate into measurable retention. While descriptive results

indicated high engagement levels and strong satisfaction scores—suggesting that gamified vocabulary applications successfully enhanced affective and motivational dimensions—the regression analysis revealed weak explanatory power. This discrepancy underscores that vocabulary retention is a complex, multifactorial construct influenced not only by gamification mechanics but also by cognitive strategies, time exposure, and learner autonomy. In other words, surface-level engagement achieved through points, badges, or leaderboards must be complemented by deeper, sustained cognitive processing to foster durable learning outcomes.

From a pedagogical standpoint, these results highlight the importance of embedding gamified tools within structured instructional frameworks rather than treating them as standalone learning solutions. Teachers should integrate gamification into broader designs that emphasize spaced repetition, contextualized tasks, and reflective feedback loops, ensuring that motivation translates into cognitive reinforcement. In the Vietnamese TESOL context—where mobile learning access is widespread but pedagogical innovation remains uneven—this blended approach could help reconcile student enjoyment with long-term vocabulary retention. Thus, gamification should be conceptualized not as a replacement for cognitive instruction, but as a motivational scaffold that sustains learner engagement while supporting traditional pedagogical aims.

Although the regression model did not yield statistically significant predictors, the findings maintain both theoretical and pedagogical relevance. The weak predictive relationships emphasize that learner retention depends on the interplay between motivational and cognitive mechanisms—including spaced repetition, intrinsic motivation, and teacher scaffolding (Nguyen, 2022) ^[11]. In this study, gamified features likely boosted short-term engagement (evidenced by mean scores above 4.2), yet their direct quantitative effect on retention was constrained by the short four-week intervention period and self-reported nature of the data, which may have inflated perceived learning gains.

Moreover, cultural and contextual factors may have moderated the observed effects. Vietnamese learners, shaped by collectivist values and respect for authority, often favor guided and structured instruction. Consequently, the autonomy-driven nature of gamified learning may not fully align with their expectations of teacher-centered classrooms. Similarly, the limited predictive influence of adaptive personalization and social interaction could stem from technological literacy gaps or unequal infrastructure, particularly in public or rural schools, which restrict learners' engagement beyond the classroom setting.

Looking ahead, future research should address these limitations through longer intervention durations, objective retention assessments (e.g., delayed recall or recognition tests), and longitudinal mixed-methods designs that capture changes in retention trajectories over time. Additionally, the inclusion of moderating variables—such as learner motivation type (intrinsic vs. extrinsic), digital competence, and frequency of app use—would yield a more nuanced understanding of how gamification operates across different learner profiles.

In essence, this study reinforces that while gamification is a powerful catalyst for motivation and engagement, its capacity to enhance vocabulary retention depends on

thoughtful pedagogical integration, cultural alignment, and sustained cognitive reinforcement. Future innovations in TESOL practice must therefore blend gamified design with evidence-based instructional strategies to realize the full potential of technology-enhanced vocabulary learning in Vietnam.

6. Conclusion

This study investigated the impact of gamified vocabulary applications on learner retention among Vietnamese EFL undergraduates using a mixed-methods approach. Quantitative results from 100 participants showed highly positive perceptions toward gamified features such as points, badges, and adaptive feedback, with mean scores above 4.19 and low variability ($SD = 0.39-0.49$). However, the regression model ($R^2 = 0.079$, $p > .05$) indicated weak explanatory power, suggesting that while gamification enhances motivation and engagement, it does not necessarily lead to measurable vocabulary retention within short-term interventions. The findings align with Flow Theory (Nakamura & Csikszentmihalyi, 2022), which emphasize autonomy, competence, and enjoyment as drivers of engagement. Pedagogically, gamification should thus serve as a motivational scaffold integrated within structured instruction that includes spaced repetition, contextual practice, and teacher mediation. For Vietnam's TESOL context, this blended approach can help balance enjoyment with cognitive reinforcement to sustain long-term learning gains.

Future research should adopt longer intervention periods and larger, more diverse samples—including rural and younger learners—to enhance generalizability. Employing objective retention measures such as delayed post-tests, alongside qualitative interviews, would better capture the cognitive effects of gamification. Comparative studies across Southeast Asia could also reveal cultural differences in adaptive feature use. Finally, incorporating AI-based analytics or neurocognitive tracking could provide deeper insights into how gamified learning influences motivation, attention, and memory. Such directions will strengthen empirical rigor and support the development of context-sensitive, evidence-based TESOL innovations.

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