International Journal of Education and Teaching Zone
Volume 5, Issue 1, 2026, pp. 109-

https://doi.org/10.57092/ijetz.v5i1.623
IJETZ
p-ISSN: 2963-7899 | e-ISSN: 2830-7925

Original Article

The Effect of Gamification in Learning English for Non Language Majority Class at University Level: Solomon Study

Arya Wira Pratama[1*], Hadiyanto[1], Eddy Haryanto[1], Bunga Ayu Wulandari[1]

Abstract: Gamification is increasingly used in higher education to enhance student motivation, engagement, and learning outcomes. However, its impact on specific English skills for non-language majors, particularly in STEM, remains under-researched, especially considering pre-test sensitization effects. This study examines the effect of Kahoot!-based gamification on English grammar, reading comprehension, and vocabulary acquisition among mathematics education students. A Solomon Three-Group design was employed: Group 1 (experimental) – pretest, treatment, posttest; Group 2 (control 1) – pretest, no treatment, posttest; Group 3 (control 2) – no pretest, treatment, posttest. Data were collected via pre- and post-tests, with analysis using paired-sample t-tests for within-group changes and ANOVA for between-group comparisons. Results showed significant improvement in the experimental group ($p = 0.008$). ANOVA indicated no significant difference between the experimental and control 1 groups, but significant differences emerged between the experimental and control 2 groups, as well as between the two control groups, highlighting the influence of pre-testing on gamification effectiveness. Cohen's d = 0.42 suggests a modest effect. Overall, the study provides evidence that gamification can enhance English learning outcomes among non-language majors, particularly when combined with initial assessment to guide targeted interventions.

Keywords :
EFL learners; Gamification in English learning; Grammar proficiency; Non English – Majors; Vocabulary Acquisition

Author Affiliation:
[1] Doctoral Program in Education, The Graduate School, Universitas Jambi, Jambi, Indonesia

***Corresponding author(s):**
Arya Wira Pratama, Universitas Pendidikan Indonesia, Indonesia.
Awpratama1994@gmail.com

Article History:
Received 3 November 2025; Revised 6 Janury 2025; Accepted 16 February 2026
Available online 28 February 2026

INTRODUCTION

Technological developments in education have transformed lesson delivery at various levels (Derder *et al.*, 2023; Johnston, 2021; Mulya & Refnaldi, 2016; Vardarlier, 2021), encouraging more interactive and student-centred pedagogies, particularly in language learning. Gamification, the integration of game elements into learning, has emerged as a relevant technique in recent years, aligning with the preferences of contemporary learners for digital, visual, and interactive experiences. It addresses the demands of 21st-century education for engagement, creativity, and meaningful learning through digital media (Annamalai *et al.*, 2022; Dehghanzadeh *et al.*, 2021). By incorporating structured elements such as points, feedback, and competition, gamification promotes fun, challenge, and interaction, which have been associated with increased student engagement and potential improvements in measurable learning outcomes (De Paiva Franco, 2022; Lee & Baek, 2023; C. Li *et al.*, 2024; X. Li *et al.*, 2022; Singh *et al.*, 2024; Tamtama *et al.*, 2020; Thanyawatpokin & Vollmer, 2022; Vathanalaoha, 2022)

Gamification is increasingly applied in English language learning because acquisition requires repeated practice, active participation, and a communicative classroom environment, though its effectiveness varies with instructional design, learner characteristics, and context (Qub'a *et al.*, 2024; Rofiah & Waluyo, 2024). Platforms like Kahoot! and Quizizz have been shown to enhance grammar comprehension, engagement, motivation, and retention in blended learning contexts, especially when structured reward mechanisms are implemented consistently (Singh *et al.*, 2024; Palomino *et al.*, 2023). Gamification has been adopted in countries such as Thailand (Vathanalaoha, 2022), South Korea (Lee & Baek, 2023), China (Fu *et al.*, 2021), Japan (Thanyawatpokin & Vollmer, 2022), Spain (Batlle Rodríguez & Vicenta González Argüello, 2023), Brazil (De Paiva Franco, 2022), and Indonesia (Tamtama *et al.*, 2020), reflecting diverse cultural, institutional, and technological contexts. Its implementation through points, levels, leaderboards, and badges supports engagement and collaboration, though it differs from full game-based learning and is influenced by classroom norms and teacher guidance (Anton Adi Purwanto & Syafryadin, 2023; Katemba, 2020; Lee & Baek, 2023; Limantara *et al.*, 2023; Mario et al., 2023; Rahma *et al.*, 2025; Williyan *et al.*, 2024; S. Zhang & Hasim, 2023). However, for non-language-major students in Indonesia, contextual factors such as readiness, disciplinary background, and classroom culture, as well as the persistent "silent mode" phenomenon, limit gamification's effectiveness, indicating a need for strategies that address verbal disengagement more directly.

Students' reluctance to participate in English class is influenced by shyness, fear of mistakes, low self-confidence, and limited language skills (Kertati *et al.*, 2023; Law, 2024; Wang & Tahir, 2020), indicating that classroom silence is as much an affective and psychological issue as a linguistic one (Fauziah & Moenindyah Handarini, 2018; Schlagenhaufer & Amberg, 2014; S. Zhang & Hasim, 2023). This silent mode challenges English learning, which relies on active interaction through discussions, presentations, and conversational exercises. Gamification has emerged as a strategy to address these barriers by creating a friendly, enjoyable, and nonjudgmental environment that increases confidence and participation (Tamtama *et al.*, 2020; Thanyawatpokin & Vollmer, 2022; Zadeja & Bushati, 2022; Pham, 2022). It also reduces anxiety by shifting focus from fear of mistakes to goal-oriented challenges, while game elements such as points, badges, and rankings provide extrinsic and intrinsic motivation (He *et al.*, 2017). Systematic reviews further show that gamification enhances attention, enjoyment, and meaningful learning experiences in EFL contexts (S. Zhang & Hasim, 2023). However, most research remains broad, rarely specifying which game mechanics are most effective for high-anxiety or verbally passive learners, and few experimental studies examine its effect on classroom silence among non-language-major students in Indonesian higher education, highlighting the need for context-specific investigation.

Despite growing research on gamification in English learning, significant gaps remain, particularly in higher education with non-language majors. Most studies focus on elementary or secondary levels and lack rigorous experimental designs to objectively measure effects (Zhang & Hasim, 2023). Evidence on affective outcomes like anxiety and participation is limited, and quasi-experimental studies show mixed results influenced by context (Cheng *et al*., 2025). This study addresses these gaps by applying a Solomon Three-Group Design, comparing an experimental group, a pretest control, and a no-pretest control, enhancing internal validity. Findings indicate that improvements in English competence depend on instructional structure, pretesting, and initial ability mapping, suggesting that gamification's effectiveness is context- and method-dependent. Therefore, this research not only shows the potential of gamification for non-language majors but also clarifies the conditions for its pedagogical optimization so that it can be taken into consideration in future learning processes (Zhang & Hasim, 2023; Cheng *et al*., 2025).

METHOD

This study employs a quantitative approach to evaluate the effect of gamification on English learning among Mathematics Education students, using pre-tests and post-tests to measure changes in vocabulary, grammar, and reading skills. Quantitative data allow objective, statistically analyzable results and comparisons between treatment and control groups (Creswell, 2014; Ary *et al*., 2010). The Solomon Three-Group Design was implemented to control pre-test effects and enhance internal validity: one group received pre-test, treatment, and post-test; a second group received treatment and post-test; and a third control group received pre- and post-tests without treatment. This design enables a more precise assessment of whether observed improvements result from gamification or pre-testing procedures (Shadish, Cook, & Campbell, 2002; Huang *et al*., 2023). The research design can be seen in Table 1.

Table 1. Research Design

	Group	Pretest	Independent	Posttest	Class Name
(R)	Experimental	Y_1	X	Y_2	Experimental class
(R)	Control Class 1	Y_1	-	Y_2	Pretest-nontreatment control class
(R)	Control Class 2	-	X	Y_2	Treatment group without a Pretest

significant evidence gaps remain in higher education contexts with non-language majors. Systematic reviews show that gamification has been widely used to support EFL/ESL instruction across various English skills, including vocabulary, grammar, speaking, and reading, but many studies are descriptive and lack rigorous causal testing (Zhang & Hasim, 2023). Empirical research in higher education demonstrates the pedagogical use of gamification to facilitate vocabulary learning and learner autonomy (Panmei & Waluyo, 2023), while mixed-methods studies report positive perceptions of gamified tools such as Kahoot! and Quizizz in grammar lessons (Pham *et al*., 2025). Meta-analyses also indicate that gamification can significantly impact language learning outcomes, though results vary by context and implementation (Lee & Baek, 2023). Furthermore, systematic evidence suggests gamification enhances learner engagement, motivation, and enjoyment, but methodological inconsistencies and limited experimental designs constrain strong conclusions about its effects on complex outcomes like oral participation and anxiety (Zhang & Hasim, 2023; Marie-De La Cruz *et al*., 2023). Collectively, these findings highlight the need for more context-specific, experimentally rigorous studies to clarify how and under what conditions gamification effectively supports English learning among non-language majors. As for Population and Sample, it can be seen in Table 2.

Table 2. Population and Sample

Population			Sample	Gender	Age Range	Class
Non Language Majoring Education Study Program	2nd semester	II A	13 students	9 Female 4 Male	17-19 years old	Experimental class
		II B	13 students	8 Female 4 Male	17-19 years old	Pretest-nontreatment control class
		II C	12 students	8 Female 3 Male	17-19 years old	Treatment group without a Pretest

Table 2 shows the population and sample distribution, consisting of second-semester students from the Education Study Program. Three classes were selected: Class II A (13 students; 9 females, 4 males) as the experimental group, Class II B (13 students; 8 females, 4 males) as the pretest–no treatment control, and Class II C (12 students; 8 females, 3 males) as the treatment-only group. Participants were aged 17–19 years, ensuring demographic comparability. Data were collected in three stages: pre-test, treatment, and post-test. The pre-test and post-test assessed English abilities relevant to Mathematics Education, covering simple past and future tenses, narrative text comprehension, vocabulary, modal auxiliaries, and comparison. Each test contained 50 multiple-choice items compiled by the course lecturer, validated with students outside the research sample, and derived from TOEFL training applications, including TOEFL Practice Test, English Stories in Learning, and English Score. The content of the tests in the research that has been carried out can be seen in Table 3.

Table 3. Content of Test

Skill	Topic / Material	Number of Questions
Grammar	Simple Past Tense	10 Questions
Grammar	Simple Future Tense	10 Questions
Reading	Narrative Text	5 Questions
Vocabulary Mastery	(Noun, adjective, adverb)	5 Questions
Grammar	Modal Auxiliaries	10 Questions
Grammar	Comparison	5 Questions

Table 3 presents the content of the test used to assess the participants' English language skills. The test covers several language areas, including grammar, reading, and vocabulary mastery. The grammar section includes topics such as Simple Past Tense (10 questions), Simple Future Tense (10 questions), Modal Auxiliaries (10 questions), and Comparison (5 questions), aimed at evaluating the participants' understanding of English grammatical structures and usage. The reading section consists of Narrative Text with 5 questions to assess comprehension skills, while the vocabulary mastery section focuses on understanding words in the categories of nouns, adjectives, and adverbs with 5 questions. Overall, the test is designed to measure participants' English proficiency comprehensively, covering grammar, reading comprehension, and vocabulary knowledge.

The research instrument was tested for validity and reliability to ensure accurate measurement of students' English learning outcomes in grammar, reading, and vocabulary. Expert judgment and pilot testing refined item clarity and content relevance, following standard procedures in language assessment (Ozer, Fitzgerald, & Sulbaran, 2014; Emmiyati, Maharani Asnur, & Ahmad, 2024). Reliability analysis showed high internal consistency, confirming the instrument's stability and consistency (Amper, 2022; Shang, 2024). These steps ensured the instrument could reliably capture the effects of the gamification intervention on student learning.. The results indicated acceptable validity, with all coefficients exceeding 0.632 based on the r-table, and demonstrated excellent reliability, reflected by a high reliability index of 0.993. These findings confirm that the instrument is both accurate and consistent for measuring students' English learning outcomes. The instrument included items assessing grammar proficiency, reading comprehension, and vocabulary acquisition, ensuring comprehensive coverage of key English skills. Pilot testing was conducted with a small group of students to identify potential ambiguities and refine item clarity. Furthermore, expert judgment was employed to evaluate content relevance and alignment with the learning objectives. Overall, these steps ensured that the instrument could reliably capture the effects of the gamification intervention on student learning. Reliability Test Results can be seen in Table 4.

Table 4. Results of Reliability Testing

Cronbach' Alpha	Cronbach's Alpha Based on Standardized items	N of items
0.993	0.993	50

Table 4. presents the results of the reliability testing for the instrument used in the study. The Cronbach's Alpha value is 0.993, and the Cronbach's Alpha based on standardized items is also 0.993, calculated from a total of 50 items. These exceptionally high values indicate that the instrument has excellent internal consistency, meaning the items consistently measure the same underlying construct. In other words, the test is highly reliable, and the responses can be considered stable and dependable for research purposes.

The study involved a six-session gamification-based treatment after the midterm for the experimental group and the no-pretest control group (control 2), covering simple past and future tenses, narrative text, modal auxiliaries, and comparison using Kahoot! with points, challenges, and leaderboards to increase engagement (Lee & Baek, 2023; Singh *et* *al.*, 2024). The researcher observed without intervening, while the conventional control group followed standard instruction with printed assignments and discussions. Consistency was ensured through structured lesson plans, identical materials, and standardized procedures to minimize implementation bias (Vathanalaoha, 2022; Palomino *et al.*, 2023). Control group data were collected in parallel without gamification, with the same topics, duration, and lecturer, while participation, task completion, and responses were documented. Assessment results were collected at the same points as the treatment group for comparative analysis. To test hypotheses among the experimental group, the control group with pre-test, and the control group without pre-test in the Solomon Three-Group design, Analysis of Variance (ANOVA) was applied, after verifying normality and homogeneity of variance with Levene's test. F values were compared at the 0.05 significance level, and effect sizes with confidence intervals were reported alongside p-values to evaluate the practical impact of gamification on learning outcomes.

Table 5. Normality Result

Class	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pretesst-Control1	0.137	12	0.200*	0.953	12	0.679
Pretest-Exsperimental	0.139	11	0.200*	0.937	11	0.489
Posttest-Control 1	0.168	12	0.200*	0.959	12	0.762
Posttest - Experimental	0.167	11	0.200*	0.916	11	0.288
Posttest- control 2	0.157	12	0.200*	0.949	12	0.626

Table 5 presents the results of normality tests for both pretest and posttest scores across the control and experimental groups. Both the Kolmogorov-Smirnov and Shapiro-Wilk tests indicate that all datasets are normally distributed, as all significance values (Sig.) exceed the 0.05 threshold. This suggests that the assumption of normality is met, allowing for the use of parametric statistical analyses in subsequent tests. Based on the table above, the results of the Shapiro-Wilk normality test indicate that all data in each group have a significance value above 0.05. Thus, it can be concluded that all data groups, both in the pretest and posttest stages, are normally distributed.

Table 6. Result Tes of Homogeneity

Statistical Reporting	**Levane Statistic**	**df 1**	**df 2**	**Sig.**
Based on Mean	0.387	2	31	0.682
Based on Median	0.266	2	31	0.768
Based on Median and With adjusted df	0.266	2	26.307	0.769
Based on trimmed mean	0.442	2	31	0.647

Table 6 shows the normality test results for pretest and posttest scores in both control and experimental groups. All Kolmogorov-Smirnov and Shapiro-Wilk significance values exceed 0.05, indicating that the data are normally distributed and meet the assumptions for parametric analyses. Based on the results of the homogeneity of variance test shown in the Test of Homogeneity of Variance table, the Levene Statistic value for the results variable, based on the mean, is 0.387, with a significance value (Sig.) of 0.682. The homogeneity test stipulates that if the significance value is greater than 0.05 (Sig. > 0.05), the data can be considered homogeneous, meaning the variance between groups does not differ significantly.

In this study, three pairs of hypotheses were formulated to examine differences in learning outcomes among the experimental and control groups. The first hypothesis (H_{01}/H_{a1}) states that there is no significant difference versus a significant difference between the experimental class and the pretest non-treatment control class. The second hypothesis (H_{02}/H_{a2}) proposes that there is no significant difference versus a significant difference between the experimental class and the non-pretest treatment control class. Finally, the third hypothesis (H_{03}/H_{a3}) asserts that there is no significant difference versus a significant difference between the pretest non-treatment control class and the non-pretest treatment control class. These hypotheses follow standard quantitative research practice, presenting null hypotheses as statements of no effect and alternative hypotheses as statements of expected effect, which allows for rigorous statistical testing and inference (Creswell & Creswell, 2018).

RESULT AND DISCUSSION

The experimental class, which received gamification-based learning, showed notable improvement from pretest (M = 64.36, SD = 16.58) to posttest (M = 79.09, SD = 11.77), indicating enhanced performance and more uniform outcomes among students. The use of game elements such as points, badges, leaderboards, and interactive quizzes likely increased motivation and engagement (Deterding *et al*., 2011). In contrast, Control Class 1, using conventional methods, also demonstrated improvement from pretest (M = 52.50, SD = 20.25) to posttest (M = 75.50, SD = 11.69), suggesting that traditional instruction can enhance learning, though perhaps less interactively. Overall, gamification appears to provide additional benefits in promoting consistent and higher learning performance compared to conventional approaches.

Moreover, extensive research has documented the positive effects of gamification on learners' motivation, engagement, and academic achievement across multiple educational contexts. For example, gamified instruction has been associated with heightened classroom engagement and sustained learner interest by incorporating motivational game elements such as feedback systems, challenge structures, and reward mechanisms (Hamari, Koivisto, & Sarsa, 2014; Hasan *et al*., 2021). In English language learning specifically, game-based elements have been found to encourage active participation, improve vocabulary retention, and foster collaborative learning, leading to stronger linguistic performance compared to traditional teaching approaches (Wong, Chai, & Aw, 2020; Alhazbi, 2022). Additionally, gamification supports psychological factors such as autonomy and competence, which are strongly linked to intrinsic motivation and deeper cognitive engagement (Dicheva *et al*., 2015; Mekler *et al*., 2017). Meta-analytic findings further suggest that gamification produces moderate to large effects on motivation and achievement outcomes, especially when design principles align with clear learning goals (Sailer & Homner, 2020; Seaborn & Fels, 2015). Collectively, these studies reinforce the notion that gamified pedagogies can generate more engaging, interactive, and effective learning experiences than conventional instruction, contributing to improved performance and more consistent outcomes.

Control class 2 only received a posttest and was given gamification-based learning without a prior pretest. The posttest results showed a minimum score of 30, a maximum of 88, and an average of 53.50, with a standard deviation of 18.61, indicating considerable variation in student achievement. The relatively moderate mean score suggests that, although gamification was implemented, learning outcomes were not as strong as in the experimental class. This may be due to the absence of a pretest, which limited the ability to adjust instruction to students' initial proficiency levels, as well as possible differences in engagement and implementation intensity. Nonetheless, the results still indicate that gamification had a positive influence, as reflected in several students achieving relatively high scores.

Tabel 5. Descriptive Analysis in Pre-test and Post-Test

Test	**N**	**Range**	**Minimum**	**Maximum**	**Mean**		**Std.**
	Statistic	**Statistic**	**Statistic**	**Statistic**	Statistic	Std. Error	**Deviation**
Pretesst-Control1	12	66.00	26.00	92.00	52.5000	5.84717	20.25519
Pretest-Exsperimental	11	50.00	36.00	86.00	64.3636	5.00050	16.58477
Posttest-Control 1	12	38.00	54.00	92.00	75.5000	3.37661	11.69693
Posttest - Experimental	11	36.00	58.00	94.00	79.0909	3.55081	11.77671
Posttest- control 2	12	58.00	30.00	88.00	53.5000	5.37178	18.60840
Valid N (listwise)	11						

Table 5 presents the descriptive statistics for the pretest and posttest scores across the experimental and control groups. In the pretest, the experimental group showed higher initial performance (M = 64.36, SD = 16.58) compared to Control 1 (M = 52.50, SD = 20.26), indicating varied baseline abilities among students. After the intervention, posttest scores increased in both groups, with the experimental group achieving a higher mean score (M = 79.09, SD = 11.78) than Control 1 (M = 75.50, SD = 11.70), suggesting that gamification-based learning contributed to improved learning outcomes. The reduction in standard deviation from pretest to posttest in both groups indicates more uniform performance after instruction. Control 2 showed minimal improvement from pretest (M = 53.50, SD = 18.61) to posttest, reflecting less effective learning outcomes without gamification intervention. Overall, these results suggest that gamified instruction not only enhances students' achievement but also promotes more consistent learning outcomes compared to conventional methods.

The descriptive results in Table 5 align with previous research indicating that gamification can significantly improve student learning outcomes and consistency. Studies have shown that integrating game elements such as points, badges, and interactive quizzes increases student engagement, motivation, and performance in various subjects (Deterding *et al*., 2011; Hamari *et al*., 2014). In particular, gamified learning environments have been found to reduce variability in student performance by encouraging active participation and sustained effort, leading to more uniform outcomes across learners (Sailer & Homner, 2020; Mekler *et al*., 2017). These findings suggest that gamification not only enhances achievement but also helps standardize learning progress among students, offering advantages over conventional instructional methods.

Table 6. Result of Annova Test

(I) Class	(J) Class	Mean Difference (I – J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Posttest-Exsperimental	Posttest-Control 1	3.591	6.040	1.000	-11.67	18.85
	Posttest-Control 2	25.591*	6.040	<. 000	10.33	40.85
Posttest-Control 1	Posttest-Exsperimental	-3.591	6.040	1.000	-18.85	11.67
	Posttest-control 2	22.000*	5.908	0.002	7.07	36.93
Posttest- control 2	Posttest-Exsperimental	-25.591*	6.040	<.001	-40.85	-10.33
	Posttest-Control 1	-22.000*	5.908	0.002	-36.93	-7.07

Table 6 presents the results of the ANOVA post hoc comparisons among the experimental and control groups. The results show that the posttest score of the experimental group did not differ significantly from Control 1 (Mean Difference = 3.59, p = 1.000), indicating similar outcomes between these two groups. However, the experimental group scored significantly higher than Control 2 (Mean Difference = 25.59, p < .001), while Control 1 also outperformed Control 2 (Mean Difference = 22.00, p = 0.002). These findings suggest that gamification-based learning in the experimental group was effective in improving student performance compared to the non-gamified Control 2 group, while Control 1, which received conventional instruction, also achieved higher scores than Control 2, but without the additional interactive benefits of gamification. The confidence intervals further confirm the significance of these differences, highlighting that gamified instruction can produce substantially better outcomes when compared to less engaging learning methods.

The ANOVA results using the Bonferroni method examined the differences among three groups in this study: the experimental class, Control 1, and Control 2, which received different instructional treatments. The experimental class underwent pre-tests, gamification-based treatment, and post-tests, Control 1 completed pre- and post-tests without treatment, and Control 2 received treatment without a pre-test. This comparison was conducted to assess the effectiveness of gamification-based English learning while accounting for the varying initial conditions of each group.In the first comparison, the Bonferroni test results showed that the comparison between the experimental class and control class 1 produced a significance value of 1.000, greater than 0.05. This indicates that there is no significant difference between the two groups. Thus, even though the experimental class received gamification-based learning, the increase in their post-test scores did not show a significant difference when compared to control class 1 who learned without gamification. Based on these results, H_o1 is accepted and H_a1 is rejected, so it can be concluded that gamification has not provided a significant advantage over groups with similar initial conditions.

The comparison between the experimental class and Control 2 revealed a significant difference ($p < .001$), indicating that the experimental group performed better despite both receiving gamification-based treatment. This improvement is attributed to the pre-test in the experimental class, which provided a baseline for targeted learning adjustments, whereas Control 2 lacked this guidance (Deterding *et al*., 2011; Hamari *et al*., 2014). Similarly, the comparison between Control 1 and Control 2 showed a significant difference ($p = .002$), demonstrating that gamification enhanced learning outcomes compared to conventional methods. These results suggest that game elements such as points, competition, and difficulty levels can increase engagement, motivation, and focus, supporting the acceptance of H_a2 and H_a3 (Sailer & Homner, 2020; Mekler *et al*., 2017).

Overall, the ANOVA results confirmed that gamification had a positive impact on student learning outcomes, although the effect was not uniform across contexts. The insignificant comparison between experimental and control class 1 indicates that the effect of gamification was not strong enough when the initial conditions of both groups were relatively similar. However, the significant difference between experimental and control class 2 suggests that the presence of a pre-test and learning adjustments based on initial mapping can strengthen the effectiveness of gamification. Furthermore, the significant results between the two control classes also emphasize that gamification can improve learning outcomes compared to traditional learning. These findings overall illustrate that the success of gamification is influenced by initial learning preparation and the suitability of the strategy to student needs.

The results demonstrated a statistically significant improvement in learning outcomes within the experimental class following the implementation of gamification, suggesting that gamified instruction can enhance student development over time within the same group (Deterding *et al*., 2011). However, within-group improvement alone does not confirm that gamification is superior to other instructional methods. The ANOVA results provide a more nuanced perspective: the comparison between the experimental class and Control 1 showed no significant difference in post-test scores, indicating that gamification did not produce statistically superior outcomes when both groups had similar initial conditions (Hamari *et al*., 2014). In contrast, significant differences were observed between the experimental class and Control 2, as well as between the two control groups, suggesting that pre-testing and structured instructional planning may have influenced learning gains. Nonetheless, this interpretation is inferential, as no additional statistical controls were applied to isolate the specific effect of gamification (Sailer & Homner, 2020).

From a factorial perspective, the results indicate that the main effect of gamification on students' English learning outcomes was not consistently evident across conditions, as its impact varied depending on the presence of pretesting and the instructional design. Likewise, the main effect of pretesting cannot be considered uniformly influential, because outcome differences were shaped by its interaction with gamification treatment rather than functioning independently. Notably, the findings suggest a potential interaction effect, where the effectiveness of gamification appears contingent on the learning context in which it is applied. Overall, gamification can serve as a supportive instructional strategy by enhancing engagement and promoting active participation; however, its effectiveness depends on the broader instructional framework, and the results do not provide sufficient evidence to conclude that gamification alone produces superior learning outcomes compared with conventional approaches (Deterding *et al*., 2011; Hamari et al., 2014; Sailer & Homner, 2020).

The practical implications of this study should be interpreted with caution. Initial assessment can guide educators in designing targeted learning activities, including gamified interventions. Gamification is most effective when aligned with learning objectives and integrated into a structured instructional framework, rather than used solely for engagement (Deterding *et al*., 2011; Hamari *et al*., 2014). While digital platforms like game-based quizzes may enhance motivation and participation, their effectiveness depends on implementation quality, learner characteristics, and context. Although gamification embodies pedagogical principles of interaction, feedback, autonomy, and competence, these do not guarantee statistically superior outcomes. Limitations include small sample size, short intervention, unequal experimental conditions, and uncontrolled factors such as learner readiness, motivation, and prior English proficiency. Effect sizes suggested modest impact, highlighting the need for further research to clarify gamification's effects across diverse learning contexts (Sailer & Homner, 2020; Mekler *et al*., 2017).

Future research should include larger, more diverse samples, longer interventions, and systematic analyses to clarify how initial ability, engagement, and instructional variables affect learning outcomes. Incorporating affective and behavioral measure such as motivation, participation, self-efficacy, and anxiety alongside cognitive outcomes can provide a more comprehensive understanding of gamification's impact on English language learning. Controlling for prior proficiency and individual differences would help identify the conditions under which gamified instruction is most effective and its contribution to sustained improvements in engagement and academic performance. The learning process in a gamification-based class is illustrated in Figure 1.

Figure 1. Gamification-Based Learning Process in the Experimental Class

Figure 1 illustrates the treatment process applied in the experimental class using gamification-based learning. The intervention incorporated digital gamified platforms such as Kahoot!, a points and reward system, and structured competitions to foster student engagement and motivation (Deterding *et al*., 2011; Hamari *et al*., 2014). Learning activities were designed to be interactive and collaborative, with students actively participating in all stages of the lesson, including quizzes, problem-solving tasks, and peer discussions. The classroom environment promoted cooperation, healthy competition, and immediate feedback, which are key elements in enhancing intrinsic and extrinsic motivation (Mekler *et al*., 2017). The researcher served as an observer to monitor engagement and instructional fidelity, while a designated lecturer facilitated the activities, ensuring that gamification elements were applied consistently. Overall, this structured approach allowed the integration of game mechanics with pedagogical objectives, highlighting how gamified learning can enhance participation, attentiveness, and overall learning outcomes in English classrooms (Sailer & Homner, 2020). Learning Process in a Non-Gamified Classroom Can be seen in Figure 2.

Figure 2. Learning Process in a Non-Gamified Classroom

Figure 2 illustrates the learning process in a classroom that did not implement gamification. In this setting, instructional activities relied primarily on Google Forms for assessment, and students completed tasks independently without any game elements, competition, or interactive feedback mechanisms (Kahoot! alternatives and digital tools reviewed by Fitria, 2023 and Alhazbi, 2022. The learning environment was largely individualistic, with minimal engagement strategies to stimulate motivation or collaboration. As a result, students' participation and enthusiasm were expected to be lower compared to gamified settings, highlighting the potential benefits of integrating game-based features to promote interaction, immediate feedback, and active learning (Deterding *et al*., 2011; Sailer & Homner, 2020). This contrast emphasizes how instructional design and engagement strategies influence the effectiveness of English learning outcomes. The Gamified Learning Process in Control Class 2 can be seen in Figure 3.

Figure 3. Gamified Learning Process in Control Class 2

Figure 3. Gamified Learning Process in Control Class 2illustrates the learning process in Control Class 2, which implemented gamification as a learning method. In this class, instructional activities incorporated game elements such as points, competitions, and interactive quizzes to enhance student engagement and motivation during the learning process (Deterding *et al*., 2011; Hamari *et al*., 2014). However, unlike the experimental class, Control Class 2 did not use a pre-test to assess students' initial abilities, meaning that the gamification activities were applied without prior knowledge of learners' baseline performance. As a result, while the gamified elements likely increased participation and attention, the absence of a pre-test may have limited the ability to tailor the intervention to individual needs and optimize learning outcomes (Sailer & Homner, 2020; Mekler *et al*., 2017). This figure highlights the importance of combining gamification with initial assessment to maximize instructional effectiveness.

CONCLUSION

The findings of this study indicate that gamification can serve as a supportive instructional strategy in English language learning by enhancing student engagement, motivation, and active participation. While the experimental class demonstrated notable improvement, the comparison with control classes suggests that gamification alone does not guarantee statistically superior outcomes compared with conventional instruction. The effectiveness of gamified learning appears to be contingent upon initial assessment, structured instructional design, and the broader learning context. Practical implications highlight that integrating gamification with targeted pre-testing, clear learning objectives, and thoughtfully designed activities is critical to maximize its benefits. Nevertheless, limitations such as small sample size, short intervention duration, unequal group conditions, and lack of robust statistical controls restrict the generalizability of the results. Future research should employ larger and more diverse samples, extended intervention periods, and rigorous analytical methods including ANCOVA, longitudinal designs, and incorporation of affective and behavioral measures such as motivation, participation, and anxiety to clarify the conditions under which gamification most effectively enhances learning outcomes. Overall, this study underscores that gamification can enrich English learning, but its impact is optimized when embedded within a comprehensive, context-sensitive pedagogical framework.

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