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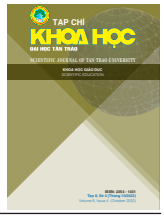

MAXIMIZING VOCABULARY RETENTION WITH GAMIFICATION TOOLS

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Abstract:

Gamification in educational settings has properly been proven to boost student engagement, motivation, and retaining abilities, which has garnered a great deal of attention in recent years. Students at Hanoi University of Science and Technology (HUST) were the subject of this action research examining the impact of gamification on vocabulary retention. The gamified learning investigation was done using a mixed-method approach for eight weeks with 29 students at HUST. The data was collected via tests and semi-structured interviews. Statistical analysis revealed that students' vocabulary scores had increased dramatically thanks to gaming-related activities. In addition, qualitative research has shown that student opinions toward the use of gamification in the classroom are favorable. The study also discusses several pedagogical implications for further studies on fostering learners' vocabulary retention.

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SỬ DỤNG TRÒ CHƠI, TRÒ CHƠI TRONG HỌC TẬP, KHẢ NĂNG LƯU GIỮ TỪ VỰNG, THÁI ĐỘ CỦA SINH VIÊN

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Sử dụng trò chơi, trò chơi trong học tập, khả năng lưu giữ từ vựng, thái độ của sinh viên.

Tóm tắt

Trong những năm gần đây, có rất nhiều học giả nghiên cứu ảnh hưởng tích cực của việc sử dụng trò chơi trong giáo dục nhằm kích thích tương tác của người học, tạo động lực và duy trì trạng thái đó trong học tập. Nghiên cứu hành động này có mục đích tìm hiểu tác động của việc sử dụng trò chơi để giúp sinh viên nhớ từ vựng lâu hơn tại trường Đại học Bách Khoa Hà Nội (HUST). Phương pháp hỗn hợp sử dụng công cụ thu thập dữ liệu là bài kiểm tra và phỏng vấn được áp dụng trong nghiên cứu kéo dài 8 tuần với đối tượng là 29 sinh viên tại HUST. Phân tích thống kê cho thấy điểm từ vựng của sinh viên tăng lên đáng kể nhờ các hoạt động chơi game được thiết kế phù hợp với bài học. Ngoài ra, phân tích dữ liệu định tính cho thấy sinh viên thích thú với việc tham gia trò chơi trong giờ học. Nghiên cứu cũng đưa ra một số đề xuất sư phạm nhằm nghiên cứu sâu hơn về việc tăng cường khả năng ghi nhớ từ của sinh viên.

1. Introduction

Recent analyses and empirical investigations have shown that game-based English language learning improves student learning results and experiences. Gamified English learning is associated with enjoyable, engaging, motivating, and fun learning experiences; it effectively delivers content language learning while increasing students' engagement, motivation, and satisfaction during the learning process [1]. [2] underlined the potential of gamified English learning to improve short- and long-term vocabulary acquisition. Empirical research on the use of gamified application tools in English learning demonstrates that they increase students' learning motivation and engagement [3], foster and reinforce learning [4], and create a more student-friendly classroom environment [5].

Gamification is the process of using game elements to make non-game activities into games [6]. Combining extrinsic and intrinsic motives uses game-like techniques such as scoreboards and instant feedback to inspire or influence user behavior [7]. Intrinsic motivation is the desire to accomplish a task that leads to superior learning and creativity. Extrinsic motivation arises when the user is encouraged to engage by external benefits unrelated to the activity, such as money, excellent grades, or recognition [8]. When assigned a challenging assignment, games push learners to do it. Teachers may include gaming aspects in courses to boost student enthusiasm [9]. Gamification has affected language learning in several ways. Since writing and speaking need memory and repetition, it may be challenging to learn English vocabulary. By gamifying vocabulary instruction and learning, it is possible to convert vocabulary acquisition and repetition into a fun learning experience. Problem-solving, cooperation, and self-directed learning are encouraged by gamification.

Due to the uncertainty surrounding the effectiveness of gamification on EFL learners' vocabulary acquisition, as well as the potential limitations of gamified learning that may prevent maximum learning outcomes, it has been determined that additional research is necessary to provide new insights into the educational value of gamified vocabulary acquisition in EFL education. In addition, despite the notion that "test results do not tell the full story," research on the application of gamification in EFL environments has focused chiefly on quantitative or qualitative outcomes. This suggests that determining the quantitative effectiveness of gamification for vocabulary retention informs readers nothing about the experiences learners have while using these tactics. In addition to assessing the students' learning results, it is crucial to study the students' perspectives on the usage of gamification in vocabulary acquisition. Despite the rising interest in the educational application of gamification or digital games, this research topic is still in its infancy. There is enough potential for future study, particularly in higher education at Hanoi University of Science and Technology (HUST). The present study intends to fill the empirical gap in the existing literature by focusing on the impacts of gamified vocabulary learning on students' vocabulary retention and the students' perceptions. Therefore, this examination primarily targeted the following research questions:

- *To what extent does gamification affect students' vocabulary retention?*
- *What are students' perspectives on using gamification to retain vocabulary?*

2. Literature review

2.1. Vocabulary learning

Vocabulary is an essential component of linguistic proficiency [5, 6, 10]. A minimum vocabulary level is necessary for a foreign language learner to acquire language skills [3, 5, 11]. The student must learn four linguistic skills (listening, reading, writing, and speaking). A lack of vocabulary affects all four language abilities [7, 8, 11, 12, 13]. [14] claim that vocabulary acquisition is a dynamic and recursive process involving integrating several information sources and the attainment of different degrees of communicative competence. According to [15], word knowledge promotes vocabulary knowledge and language usage, facilitating word knowledge and vocabulary knowledge. A term's comprehension requires both receptive and productive knowledge. [15] defines word knowledge as the capacity to identify spoken and written forms and meaning. [13, 15] state that vocabulary is crucial for language instruction. Without expressive language, L2 communication is pointless. Vocabulary development is seen as the element of language acquisition that is least cared for.

According to [15], there are around 2,000 high-frequency phrases in English that are so crucial that instructors and students should go to any extent to understand them. This author also argues that a vocabulary of 15,000 to 20,000 words is required for distraction-free reading. While a set of rules governs grammar, vocabulary is more open-ended; even seasoned native speakers continue to acquire new terms. It is the most challenging obstacle to overcome while learning a foreign language. Vocabulary should play a significant part in teaching a foreign language, and learners need tools for lifetime education. [16] figured out that people cannot learn a term from a single discussion; they need several connections. Up to 16 encounters may be required to learn a new word. Learners should be given appropriate expectations about their ability to acquire a new term permanently, and they should be encouraged to repeat vocabulary exercises and study a wide range of literature. Since all word knowledge ranges on a continuum acquiring a word is a process, not a one-time occurrence.

2.2. Vocabulary learning strategies and vocabulary retention

Memory and the capacity to remember and retain knowledge are interdependent [16, 17]. With sufficient focus, time, and consolidation, information from sensory memory may be transferred to long-term memory [18]. Linking new and old information improves the retention of new information [19]. Memory influences both language learning and success [9, 11, 20]. It is necessary to link form and meaning while learning a word. This connection may consist of first language equivalents, L2 synonyms or in-text meanings, sounds, visual imagery such as static images or dynamic videos/ animations, sentiments and emotions, a particular event or setting, or a combination of these [18, 19, 20]. To transfer material effectively from working memory to long-term memory, foreign language learners must actively rather than passively manage it [17].

Additionally, foreign language learners must connect new material to prior information stored in long-term memory [7, 8, 18, 20]. Identifying things in the mental lexicon is one strategy for transferring new lexical terms from short-term to long-term memory (Yoshii, 2014). Information is considered to be transferred when L2 learners move target words from short-term to long-term memory [17]. For students to learn new words and commit them to memory, vocabulary acquisition tools are necessary.

2.3. Gamification in language learning

According to [21], technology and globalization have accelerated the rise of English as a commanding language for communication across fields. As a result, many learners have discovered that traditional English learning, in which they are not involved in their learning and are frequently viewed as passive receivers of information, did not prepare them for real-world language use. The typical classroom might be converted into a more adaptable, modern setting that encourages collaboration. Gamification uses game design features, game mechanics, and game thinking for motivating purposes. When properly applied, gamification encourages and engages learners [13]. Games are a classic example of active learning in foreign language classes. In the digital era, gaming technology directly influences learning and the ability to enhance education [3]. Language games provide variety to classes, break up the monotony, animate classrooms, and engage students [7]. According to [1], gamification promotes active learning and boosts students' motivation and enthusiasm for education. According to [5], the objective of gamification in education is to give students a more engaging, effective, and enjoyable educational experience. Some students may lack the motivation to study an L2 due to prior experiences, a lack of interest, or the method of instruction. Gamification fosters an engaging and non-threatening learning environment for L2 learners. Increase student engagement, emotional investment, and enjoyment using educational games [6]. Gamification uses game elements to promote desired behaviors and accomplish organizational learning goals. Several researchers, including Zainuddin et al., have studied the educational effects of gamification. Educational games differ from pure entertainment games in that their primary purpose is to educate and train the player, and entertaining elements are used to promote learning [9]. According to [22], gamification enhances teaching and learning results and satisfies student needs. Gamification in learning and instruction is seen to have broad appeal among students. Gamification is not about technology or a digital platform but rather the development and distribution of new training. Its purpose is to inspire and motivate users via game elements like points, leaderboards, and instant feedback [4]. Gamification in L2 learning substantially enhances the learning process by aiding L2 learners with personality traits.

Although convenient, it has several disadvantages. Gamification should not be used in place of other instructional methods. [22] argue that technology should not replace the unit's or module's principal objective in a gamified classroom. Every class must have access to current instruments. As digital technology becomes more pervasive and accessible in classrooms, the gamification of education will become more straightforward and more extensive [19]. The L2 instructor must use gamification technologies by the desired audience and the appropriate language learning approach or technique [22]. Teachers must safeguard students from irresponsible technology use and distractions.

2.4. The effectiveness of gamification on vocabulary retention

In gamification research, digital games are most commonly used to increase vocabulary learning [23]. According to [24], 21st-century talents were investigated the least in gamification literature. Despite the paucity of research, there is evidence that digital games may enhance cooperation and communication. The dearth of research in this field may be attributed to the fact that cooperation is not considered a language skill, despite its importance in effective communication. As a result, language-learning games may not foster as much collaboration as other game kinds. Recently, [25] did a meta-analysis of digital game-based second language acquisition, focusing on vocabulary and study techniques. This research indicates that gamification significantly surpasses conventional training in terms of L2 vocabulary performance. The authors discovered that when video games were combined with conventional instruction, the game genre, the educational level of the learners, and their L2 proficiency all influenced L2 vocabulary acquisition results. Besides, problem-solving, simulation, and decision-making-based games beat drill-and-practice games. The findings also emphasize that drill-practice games may satisfy the learning objective, but they may be less game-like in fostering engagement. Flow experiences are likely to occur in task-based games, an essential goal of educational games. The performance of college, preschool, and elementary students was superior to that of lower and upper secondary students. In the papers evaluated by [24], university students were chosen as samples the most frequently. Those investigators highlight additional variables that may have impacted these results, rendering conclusions regarding educational level dubious. They also conclude that digital games have the potential to have a significant influence on L2 vocabulary acquisition (for learners beyond the beginner level). This indicates that digital vocabulary acquisition games may be advantageous for secondary school students, at least in Finland, where learners begin learning English in elementary school and are not novices by reaching secondary school. The authors suggest that university students with advanced L2 competence engage in task-oriented digital games to improve their L2 vocabulary.

[26] found that learners' age or linguistic background had no bearing on the benefits of gamification on

vocabulary acquisition, but the game design did. This research investigates if the educational level (learner age) affects gamification, as [25] claimed. [26] define linguistic background as learners' native language; hence, their results are primarily compatible with [25]. According to [26], adventure-based games may be more engaging, interesting, and motivating than non-adventure-based games due to their bigger impact size. They refer to non-adventure games as drill and practice games. Adventure or task-based games do not need a storyline, but instructional games must be interesting to increase vocabulary acquisition. [26] did not study gender variations in what learners perceive as enjoyable, nor did they define adventure-based games without a storyline.

Vietnamese educators have paid much attention to technology mediation to promote students' vocabulary acquisition. [27] conducted mixed-method experimental research to compare the effectiveness of a digital vocabulary learning application called Quizlet to a more traditional method, such as paper flashcards, among students learning English in Vietnam. In this country, English teaching and learning is a government priority. As seen by the reports that have been generated so far, government policies try to encourage growth in the field by encouraging activities such as the use of digital media in educational settings. As a result, it is appropriate to assess whether using digital media in EFL instruction is justifiable. This is the practical rationale for this study, which compares a digital tool to a more conventional instrument used for the same objective, L2 vocabulary acquisition.

[28] aim to explore the impact of Quizizz on EFL students' vocabulary performance and assess the learners' impressions of using this digital software at a public-stated university in Hanoi during the Covid-19 epidemic. This exploratory study was undertaken over an eight-week intervention period throughout the 2020-2021 academic year. A curriculum-based vocabulary exam and an interview were used as data collecting approaches to measure the students' vocabulary accomplishment level and get their feedback on the online quiz. Mean scores, standard deviation, and t-test results showed a significant difference between the control and experimental groups. It has been shown that the vocabulary of those who participated in the experiment increased. In addition, qualitative data provided a deeper understanding of how students perceive the use of Quizizz in the context of vocabulary instruction. It was recommended that the university assess several instructional consequences for any future installation of Quizizz at the institution.

The action research by [29] evaluates the impact of Mobile-Assisted Language Learning (MALL) on the vocabulary acquisition of first-year students and their impressions of this instructional strategy. Twenty-six students from a private university in the North of Vietnam participated in an eight-week. The researchers employed an attitude questionnaire, a pre-test, a post-test, and a delayed post-test to triangulate the results. In addition, a semi-structured interview was done. Using SPSS 25, the T-test and Cronbach's alpha coefficient were performed to confirm the research's internal consistency and reliability and prove its validity. The results suggested that classrooms with MALL integration offered participants a considerably enhanced vocabulary and increased their desire to utilize MALL to increase their lexical knowledge. This was accomplished by giving participants with significantly enhanced vocabulary performance. Educators have also been asked to consider numerous pedagogical implications while teaching vocabulary and the future study on the development of a MALL-enhanced framework for vocabulary acquisition.

3. Methodology

3.1. Setting and participants

The investigation was conducted at Hanoi University of Sciences and Technology (HUST) with 29 students from the university's various schools and departments. They have reached the pre-intermediate language competency level. Their textbooks are Collins' "Get Ready for IELTS" series as part of their English development curriculum. Before collecting their data, the researcher ensured their agreement, telling them that their responses would be used only for the research and that their identities would be kept confidential.

3.2. Methods

This study employed an action research design in which the teacher-researcher implemented gamification to promote students' vocabulary learning and retention. In addition, the researcher used both quantitative and qualitative approaches to collect data in an eight-week intervention. One week before the beginning of the gamified learning treatment, the participants took the pre-test. During the treatment, the teacher-researcher developed quizzes using Quizziz and Quizlet, which then were used to review what they had learned in class. Students accessed online games using their smartphones. After each question, they were entitled to check their scores on the game's scoreboard. In the last week of the intervention, the immediate post-test was administered to the students. Three weeks later, students were given a delayed post-test to see how well they remembered the words and phrases. In addition, three students whose lowest scores and the other three with the highest ones on the delayed post-test participated in semi-structured interviews to explore their thoughts on using gamification to learn and recall the new language.

3.3. Data collection instruments and data analysis

3.3.1. Pre-test, immediate post-test, and delayed post-test

Participants ' gains and retention were evaluated using pre-test, immediate post-test, and delayed post-test evaluations. Each of these paper-based exams had 50 questions equivalent to ten marking points. The participants had to match words and their meanings to pictures, fill the right words in the blank, and do sentence structure exercises. The tests were validated by administering them to three additional HUST English instructors. As a result of their suggestions and criticisms, the study's objectives and textbooks were included in the questions' development. Researchers developed an assessment form for experts to use in determining whether each item satisfied the stated objectives of the project. These tests generated quantifiable data that could be used to determine if the intervention affected the results. In order to ensure the test's validity, learners were informed that their scores would not be affected their academic results this semester.

SPSS 25.0 was used to evaluate the exam results. To ensure consistency, the pre-test results of the subjects were first analyzed for homogeneity and normality. The previous knowledge of course participants may differ. The evaluation of the pre-tests for both courses using means, standard deviation, and the paired-sample t-test was conducted to explore whether there was a significant difference between the scores of immediate post-test and delayed post-test.

3.3.2. Semi-structured interviews

After getting the delayed post-test score, the six students who participated in the semi-structured interview were the three with the lowest scores and the three with the highest. Due to the students' hectic schedules, the researcher conducted the interviews through Zoom. Each interview lasted around fifteen minutes and consisted of ten questions. With the students' permission, the interviews were videotaped for subsequent examination. In addition, the interviewer made notes throughout the session in order to examine them afterward. The interviews were done in the mother tongue to avoid misunderstandings or ambiguity. In order to present the results, the qualitative data were processed utilizing a five-step procedure that included transcription, separation, category, coding, and description.

4. Findings and discussions

The study aims to determine the impacts of gamification on vocabulary learning at HUST. To help answer the research questions, a pre-test, an immediate post-test, and a delayed post-test were given to the participants. The statistics analyzed from SPSS using the pair sample t-tests were demonstrated as follows.

4.1. The impacts of gamification on students' vocabulary retention at HUST

The numeric data were analyzed to answer the first research question. Table 1 indicates paired sample t-test among pre-test, immediate post-test, and delayed post-test.

Table 1*:* Descriptive statistics and paired sample t-test

	N	Minimum	Maximum	Mean	Std. Deviation
Pre-test	29	4.0	8.0	6.379	1.0147
Immediate post-test	29	6.0	9.0	7.966	.7784
Delayed post-test	29	6.0	9.0	7.207	1.0481
Valid N (listwise)	29				

Paired Samples Test

Mean		Paired Differences					t	df	Sig. (2-tailed)
		Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference					
				Lower	Upper				
Pair 1	immediate post-test - pre-test	1.5862	1.3233	.2457	1.0828	2.0896	6.455	28	.000
Pair 2	immediate post-test - delayed post-test	.7586	1.1543	.2144	.3195	1.1977	3.539	28	.001

Table 1 indicates that pre-test scores (M = 6.379, SD = 1.0147) are lower than immediate post-test ratings (M = 7.966, SD =.7784), which are higher than pre-test values. Specifically, a gain of 1.587 points was seen between the pre- and post-intervention examinations. This means that participants' vocabulary scores increased by 1.5 points on the immediate post-test. The mean and standard deviations of the students' vocabulary scores demonstrated a substantial increase. To determine if there was a statistically significant difference between the means of the two tests, a paired-samples t-test was used. A comparison of the average pre- and post-test scores reveals a significant change. A paired-samples t-test revealed that pre-test scores and those obtained immediately after the intervention differed substantially. Using gamification in the classroom enhances students' vocabularies. The expansion of students' vocabularies seems to be encouraged by gamified learning, to put it another way.

In addition, no statistically significant changes were seen between the immediate post-test findings and the delayed post-test results. From the immediate post-test to the delayed post-test, scores decreased dramatically from 7.966 to 7.207. With a 95% confidence range spanning from 6.93 to 11.98, it was easy to ascertain that the mean score between the immediate and delayed post-tests decreased by just 0.759 points. The range of the immediate post-test is 6.93 to 11.98. Based on these findings, students could retain an incredible amount of language over an extended time. The critical value of p for two-tailed tests with 28 degrees of freedom was 28 in this research, which was another significant discovery. In addition, the p-values for the immediate and delayed post-tests differed substantially, with the latter being statistically significant at 0.000, which is less than 0.05. Immediate and subsequent post-tests showed this difference. In the end, the research findings suggested that the performance differences between the immediate post-test and the delayed post-test were minimal. Three weeks following the intervention, a decline in the amount of retained language was seen, or, to put it another way.

Following is a chart depicting the pre-test, immediate post-test, and delayed post-test approaches.

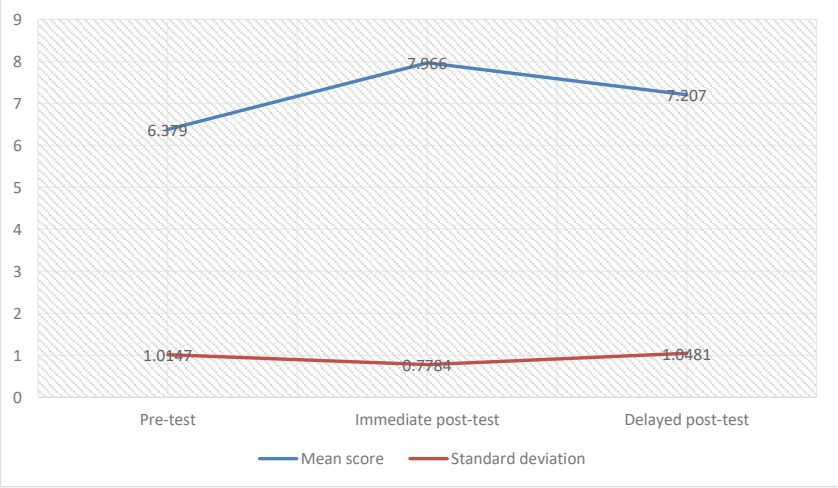

Figure 1*:* The mean score and standard deviation of the pre-test, immediate post-test and delayed post-test

The learners' performance on the post-test after adopting gamification to learn was, on average, more robust than their performance on the pre-test. The table shows the mean score at 7.966 in the immediate post-test compared to 6.379 in the pre-test). In addition, the score on the delayed post-test was lower than the score on the immediate post-test, which was 7.207, while the immediate post-test score was 7.966. Despite this, the result of the delayed post-test was much greater than the result of the pre-test. Because of this, it is reasonable to conclude that gamification might be beneficial to students in terms of increasing their vocabulary and that words learned via activities helped by technology were kept without substantial loss three weeks later.

4.2. Students' perceptions of gamification at HUST

Gamification was well-received by students, who saw it as a technique to involve them more deeply in the course than they would have otherwise. Gamified learning is seen as a way to boost participants' interest in learning, given that playing games is pleasurable and may inspire people to learn. Student S3 was pleased that he, his classmates, and his instructor could simultaneously study English via computer games. S6 appreciated computer games because they allowed her to learn while having fun. "*Despite the little time we had to study it," she remarked, "I found it important*." Student S2 was also pleased with the game since he

gained new knowledge and a more profound respect for English.

Secondly, because students of all levels like playing video games, it has been shown that game-based learning is an excellent method for building vocabulary and language skills. However, all three games helped students acquire vocabulary and other language abilities, some preferred Quizziz above the others. By utilizing these programs, student S5 was able to show an increase in his ability to recollect English words. By playing these games, student S1 was also able to improve their English reading and decision-making skills. She continued, *"I loved studying English with the instructor via games since it was so enjoyable, and I could see my English progress*."

Having a good time while playing games is a great way to meet new people in terms of socializing skills. Playing games with their pals was enjoyable for the learners. They were more attentive to the topic, although their comprehension varied. They were eager to play the games with their friends since they could compete against one another and work together to discover the solution. She expressed excitement about competing with her peers. Students like student S2 believe that playing video games improves their learning ability. When student S3's answers were inaccurate, she cited timidity, while others said they could not compete with their peers due to certain limitations.

Most respondents said the gamification sessions were engaging since students could utilize high-tech gadgets to study English. They understood the significance of science and technology in the world of the 4.0 era. The last topic of discussion was study motivation. Both internal and external pressures drove students to remember the terminology they had learned in class. As a consequence, youngsters may get higher scores while playing digital games.

5. Discussions

There was a significant difference in vocabulary learning before and after the gamification intervention when the p-value was 0.05 or below. This result aligns with [4, 27, 28, 29]. In semi-structured interviews, students reported that they appreciated learning sessions that incorporated games. This phenomenon may be explained because youngsters like playing games by nature (mainly digital interactive ones). No matter how the games are used in the learning process, the students will enthusiastically enjoy and participate in the lessons. Learners are more likely to stay if the activities are entertaining and engaging. Due to their engagement in and appreciation for the course, the students could retain their vocabulary.

In contrast, because they had previously studied a vast vocabulary, the likelihood of forgetting words during the immediate post-test was high. The results indicate that there were few variations between the two post-testing intervals. According to qualitative research, one probable explanation for the decrease in learners' ability to recall English after three weeks is that they spent too much time playing games.[27, 28, 29] all found similar results. If students do not participate in game-based learning activities for an extended time, their word recall may decrease. In interviews, several learners said that they played digital games to compete with their peers and have their names shown on the scoreboard. This is plausible. According to individuals, many participants may not have been able to pay attention to the test questions since the intervention's digital game was relatively fast and forced players to think and respond quickly to get more points. In order to keep newly learned language in short-term memory, where it may be used immediately, students must focus on a stimulus for at least 20 to 30 seconds prior to recognizing its significance and then practice using it. They could not recall the language they had learned since they had less time than their counterpart to concentrate and comprehend the questions. [26] found that digital games may increase student learning motivation and facilitate learning. In addition, they said that gamification might assist them in learning more languages. The stress of studying was alleviated by appealing to learners via games, making the task more enjoyable. According to [3], using technology-mediated games may boost students' attention, pleasure, motivation, and satisfaction while also fostering an atmosphere in which students actively participate in classroom activities. Separate research found that digital games improved both student motivation and learning results. The research findings referred there was a substantial difference in post-test performance.

The data analysis indicates that most students approved the use of gamified classroom activities. This is likely because students knew how many points they received for each question based on how quickly they responded. Since each student's responses were only shown on their screen, other students could not determine whether they were correct or incorrect. Players were more competitive when the top three scores for each question or game were shown on a scoreboard, as they wanted to have their names displayed. The names of the top three scorers will be listed. In addition, students who are deemed digital natives are more likely to benefit from gamification due to enticing elements such as a bright screen and appealing music or an immediate scoreboard in gaming apps. According to [29], the eagerness of students to utilize digital devices such as smartphones, tablets, and PCs led to a more engaging classroom environment.

As a result, they raised their energy levels and made the encounter more enjoyable. [28] advocate that the electronic educational game's motion, colors, stimuli, and visuals may facilitate language acquisition and student engagement. This research indicated that EFL students at HUST prefer gamification in the digital age because it provides a more engaging learning environment. They may utilize gamified learning to improve their vocabulary retention and raise their enthusiasm for language study.

6. Conclusions, implications, and recommendations

The use of gamification within the boundaries of HUST was quite noteworthy. The primary objectives of the current study were to evaluate the impact of gamified learning on the development and retention of students' vocabulary, as well as their attitudes toward gamification. This research indicated that gamification might be an effective strategy for teaching college students English as a foreign language. The vocabulary test results administered before and after the intervention were considerably different, owing to the test's extensive use of gamification. It seems inevitable that gamified learning will assist students' language acquisition and retention. In addition, the learners viewed favorably the teaching material that integrated gaming activities. Due to the pervasiveness of technology in the lives of members of the millennial generation, educators are charged with creating educational materials that are both relevant to the current world and capable of meeting the unique needs of each student.

There are three critical implications for educators, classroom instructors, and curriculum creators inferred from the study findings. The findings on students' vocabulary growth may encourage educators and course developers to consider the use of gamification in English language classrooms. Gamification is an effective method for increasing vocabulary size and fluency in higher education students. The findings on students' vocabulary growth may encourage educators and course developers to consider the use of gamification in English language classrooms. However, the rate of vocabulary retention remained relatively low; consequently, it may be suggested that educators and teachers place a greater emphasis on certain aspects, such as the competitive learning environment and the length of the game, which may affect students' ability to remember words and phrases. Secondly, the findings of this study indicate that gamification can boost both the learners' positive perceptions and their motivation to learn. To guarantee that students see the study of English as including fascinating lessons, teachers and educators must develop engaging activities for students while studying and foster a pleasant learning atmosphere. Despite the many benefits that gamification has brought to the study of the English language, most HUST professors do not employ it in their classrooms. It is recommended that instructors create new course outlines and instructional materials that are relevant and suitable for students reared in the digital era. In addition, teachers might employ gamified learning strategies in conjunction with other language skills to pique students' interest in their lessons.

Even though the present study makes substantial contributions to gamification research, there are still a few unanswered questions. Due to the limited number of studies investigating the effects of gamification in HUST or Vietnamese contexts, future research should investigate the same context with other English proficiency levels of EFL learners to determine the factors that influence students' vocabulary acquisition and retention. Second, more studies might compare two specific uses of digital games with massive quantities of data and other language skills. Thirdly, while comparing the results of the experimental class's vocabulary acquisition to those of the control class, it is essential to analyze the effectiveness of gamification in more detail.

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