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The effectiveness of gamified learning environments in promoting grammar mastery in Jordanian secondary school EFL learners

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Abstract

This study examines the effectiveness of gamified learning environments in improving grammar mastery and engagement among Jordanian secondary school EFL learners in Saudi Arabia. The research aims to explore the impact of gamification on learners' cognitive, emotional, and behavioral engagement while addressing the challenges faced in grammar instruction within this educational context. A quantitative experimental research design was employed, involving 120 students divided into an experimental group (exposed to a gamified grammar intervention) and a control group (taught using traditional methods). Data were collected through pre-tests, post-tests, and engagement questionnaires. Statistical analyses, including ANCOVA and effect size evaluation, were conducted to determine the impact of gamification on grammar proficiency and student engagement. The results indicate a significant improvement in grammar mastery among students in the gamified learning environment, with a 41.91% increase in proficiency compared to 13.41% in the control group. The experimental group also demonstrated higher scores in behavioral, emotional, and cognitive engagement, confirming that gamification enhances both learning outcomes and student motivation. Effect size analysis revealed a large impact of gamification on grammar achievement and engagement levels. This study provides empirical evidence supporting gamified learning as an effective strategy for enhancing grammar acquisition in EFL contexts. The findings highlight the role of gamification in fostering engagement and improving learner performance, suggesting that it can serve as a transformative approach in language education. The study offers valuable insights for educators, curriculum developers, and policymakers, emphasizing the need to integrate gamification into EFL instruction. By incorporating game-based elements, teachers can create a more engaging and effective learning environment, potentially improving long-term grammar retention and student motivation. Additionally, cultural considerations should be taken into account when implementing gamified learning to ensure its effectiveness across diverse educational settings.

Keywords: EFL learners, gamification, grammar mastery, quantitative research, and student engagement.

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1. Introduction

Grammar is one of the most important areas in EFL learning as it lays the core foundation on which communicative and linguistic proficiency is built on. However, grammar still poses a major concern for EFL learners nowhere except in Jordan; where Jordanian students find themselves. The relative cultural, linguistic and educational contexts foster another challenge of learning grammar in such settings. Fostering such changes requires: innovative instructional practices, one of which is GLE, proposed educational intervention that incorporates gaming mechanisms with teaching methods to improve learners' performance [1].

There are several challenges that characterize Jordanian secondary school EFL learners when learning English grammar due to the differences between the two languages: Bahasa Indonesia and English. Prior literature reviews have also established how features at the morphological and syntactic levels cause constant mistakes in specific segments of the language, including verb conjugation, tense, and word order. Furthermore, conventional pedagogy and approaches that dominate teacher-centered courses in classrooms do not encourage meaningful and lasting engagement [2, 3]. This is even harder for Jordanian learners in Jordan because they have to adjust themselves not only to the Jordanian culture and education system but also to learn English in a non-native country.

These problems have been found to be compounded particularly in modules that need a lot of technical skill, and have led to the rise of gamified learning which is the incorporation of fun aspects, compensation, and competition into learning. Research shows that gamification makes use of intrinsic incentives and results in better cognitive absorption of knowledge in learners specifically regarding language acquisition [4, 5]. Using such game features like point system, leaders and badges in contextual learning approach to enhance grammar lessons can help teachers turn grammar practices into enjoyable and entertaining tasks. Trends revealed in studies conducted over the last years suggest that the use of gamification leads to a tangible increase in the effectiveness of learning: a positive attitude towards L2 learning and increased self-estimated learner competence [6, 7].

The use of game-based learning in the EFL classrooms has attracted some interest recently with an increase in the number of studies highlighting its ability to foster grammar acquisition. For example, Koç and Sütçü [8] established that gamification enhances students' grammar accuracy and their retention rates based in EFL. The same has also been supported by Tashtoush, et al. [9] whereby incorporation of game elements helped to enhance learner interest and accomplishment especially for basic activities such as drill. However, based on these works, there is still a dearth of research works on Jordanian EFL learners especially those learning in distinctive educational environment like Jordan. There is therefore a dearth of research on local samples that would estimate the effectiveness of gamified interventions for this particular type of learner.

The Jordan educational context is another important layer that makes the research of gamification more challenging. The Jordan education system which is grounded in Islamic instructional practice may not be compatible with the disciplinal, drill like, and less interactive approaches of gamified learning environment [10]. This is also a challenge and opportunity for Jordanian learners to accommodate this educational culture and also for them to learn English grammar. As will be discussed in this paper, gamification in language learning, with focus on engagement and learner control, may help to mediate between these opposing educational paradigms, thus helping learners master numerous aspects of grammar more efficiently.

Further, the applying of the gamified learning concept can be associated with the general trends for developing technology-enhanced learning, which has become even more effective due to COVID-19. The shift of the world's population to digital environments has called attention to the need for tech-based approaches in solving issues of learning inequity [11, 12]. Thus, gamification is a progressive paradigm that complies with contemporary approaches to teaching and learning and considers numerous requirements of EFL learners in a blended or distance learning context. Another research by Su and Cheng [12] and Pechenkina, et al. [13] stress how gamified mobile applications have helped improve learners' activity level and performance, and how this supports the use of this type of intervention across multiple learning environments.

In addition, gamified learning environments benefit EFL learners since they promote individual differences and learning ability of students, which is important for group learning with students of different achievements. Due to the flexibility in

presenting new knowledge and problem solving scenarios in the form of challenges and rewards, it is definitely possible to act upon the needs of each learner and motivate them after the completion of a specific level [14, 15]. For Jordanian secondary school learners in Jordan, this approach could actually help reduce the effects of diversity in classroom making them improve on their grammar and confidence on the use of English.

Nevertheless, the use of GAME-entrenched learning interfaces in EFL grammar teaching and learning continues to be uncharted in the Indonesia- Jordan context. While most prior research works have provided insight into the effects of gamification for vocabulary enhancement or reading and overall language performance, fewer studies have emphasized the part that games play in grammar instruction [16-18]. Thus, availing this study intends to unveil the extent to which gamification boosts grammarians' performance among Jordanian secondary school EFL learners studying in Jordan. Thus, I seek to fill gaps of literature in the study of English as a Foreign Language in order to offer practical solutions to educators and policy makers interested in improving EFL instruction with the help of new best practices [19, 20].

1.1. Problem Statement

Punctuation and grammar still present difficulties for EFL learners and middle school students from Indonesia now learning in Jordan. Though grammatical development serves as the strong basis of any communication process, learners are always challenged by the complex grammatical procedures, thus limiting the overall language abilities. Many traditional instructional methods, which include memorization, use of instructions and teacher centeredness lack the capacity to address learners with exceptions. However, in pursuit of the overall of the Jordanian educational system that is grounded in disciplined and rote method, the students are far from accessing the interactive learner-cantered grammar instruction.

This places gamification into contexts of the increasing number of the learning environments to address the liabilities defined above by emphasizing the learning element of game mechanics as a key presupposition for the implementation of successful gamified learning environments. In a number of contexts, the experience has been posited to encourage learning related engagement, motivation and self-determined benefits such as retention suggesting that gamification is effective in language learning. Nonetheless, works has been done towards focusing on the effects that the intervention has on grammar skills, clearly, and especially among Jordanian learners learning in Jordan, has not been well explored. This lack of studies underlines the importance of empire research for the purpose of assessing the impact of gamified environment on learning grammar in EFL context.

1.2. Questions of the Study

1. How does the implementation of gamified learning environments affect grammar mastery among Jordanian secondary school EFL learners in Jordan?
2. What is the impact of gamified learning on learner engagement and motivation in grammar lessons?
3. Are there significant differences in grammar proficiency outcomes between learners in gamified and traditional learning environments?

1.3. Study Significance

The current study forms part of a corpus focused on effective pedagogy with regard to the use of games in EFL grammar education and as such offers new insights into the efficacy of gamified learning contexts. In contributing for filling this gap found in the literature review, the outcomes of this study will provide useful information for the application of gamification to Jordanian secondary school learners in Jordan.

Furthermore, this study has significant implications to educators, curriculum developers and policymakers. To educators specifically, it offers tangible recommendations in how to improve grammar instruction and how to help learners engage better. To curriculum designers this has shown how the incorporation of gamified aspects into the kind of EFL curriculum might positively impact learning success. Last, and most important, for the policymakers the presented results speak for learner-cantered integrated information technologies as the ways to tackle the persisting issues in the sphere of language education. The findings of the current study thus can help to fill this gap and make sure that the current formulation, definition and application of the gamification is both theoretically grounded and substantiated with evidence-based practices in multiple EFL settings.

1.4. Terms of the Study

The current study was carried out in the period of one academic semester in Jordan on Jordanian EFL learners in secondary schools. What is more, it pinpoints grammar instruction particularly and gamified learning environment to be an instructional approach more specifically. Gamification of learning involves a process of integrating game elements into learning processes including, reward systems, points, Badges, leading boards and challenges into teaching methodologies in order to improve learners' affairs. Grammar, intentionally used in this study concerns the extent to which learners are able to apply grammatical features in written and spoken English; pre-test, post-test and transactional activities.

Quantitative research is used in this work and utilizes a pre-test and post-test experimental method to determine the effectiveness of the gamification in enhancing grammar knowledge. Quality of engagement and learner motivation are also assessed using translated standardized questionnaires appropriate for a gamified learning environment. Despite the fact that the study is concerned with the teaching of grammar ONLY, the implications of the study may be generalized to some of the other facets of learning the English language.

1.5. Limitations

However, the results of this study have limitations that constrain the understanding of the effectiveness of game-based learning environment. First, there is limitation of time that is one semester of study; one cannot tell the fact that the retention of grammatical knowledge, or personnel changed once they left the classroom. Second, the present study is carried out with reference to Jordanian secondary school learners in Jordan and therefore the results may not be generalized to other EFL learners or other contexts.

Further, the study is based on only quantitative data analysis tools which include pre-tests, post-tests and questionnaires. While these methods help to deliver rather reliable data, they can be insufficient for studying the experiences of learners in the context of gamification in detail. It would be advised able for future research to adopt use of more form of data collection methods such as interviews or even emerging data gathering techniques like classroom observations. Last of all, this research targets grammar skills teaching and learning, therefore, there is no specific information on other skills such as speaking, listening or even acquisition of the needed language vocabulary for mastery.

2. Literature Review

Gamification, as the use of game mechanics in non-gaming environments, has become a shifting approach in learning, especially in the teaching of languages. Based on SDT, and more specifically Sailer, et al. [21], gamification utilizes genuine incentives in terms of flow, which is fostered through autonomy, competence, and social relatedness. These elements are useful in capturing learners' attention and improving their learning process outcomes. Consequently, in EFL learning context, gamification provides a more engaging approach to learning compared to the conventional teaching approaches used in learning areas such as grammar which tend to be considerably unengaging. Grammar as part of the language mastery importance creates the framework for smooth communication. Nonetheless due to its conceptual and more formal and formalized structure, it proves rather difficult for learners particularly in contexts where reliance on transmissions modes of treachery SALE asks and memorization is common practice [22].

The potential of gamification is to turn otherwise boring grammar drills into fun and engaging activities. While points, badges, leaderboards and challenges make the learning process resemble playing a game, learners feel accomplished and exercise competition instincts [23]. Studies have revealed that gamification not only leads to higher level of development but also results in higher learners' motivation, retention rate and performance [24]. This is especially the case in EFL learning since they have difficulties with mastering formal syntactic patterns. Some of the most current examples of the use of digital tools in teaching grammar include Kahoot!, Quizizz and Duolingo, all of which utilize forms of game to enhance grammar learning. Research has shown that these platforms increase grammar correctness and learner retention to a much greater extent, particularly among the young [25, 26].

Although there has been significant literature touching on the subject of gamification in education most of them do not apply well to culturally diverse EFL classes. This study targets a special group because Jordanian secondary school learners in Jordan have specific educational needs that can be unique as compared to learners in Indonesia. The syntactic dissimilarities between Bahasa Indonesia and English combined with modifying circumstances to fit Jordan educational system adds to the complexity making grammar difficult for this group as noted by Marzuki and Kuliahana [27]. These principles are based on Islamic pedagogy, under which Jordan schools operate: discipline and memorization are the key values contradicting the social, interactional essence of gamification [28, 29]. Knowledge of how to apply gamification effectively to meet the needs of the Jordanian learners is important for optimally enhancing the positive effects of the strategy.

There appears to be a significant interest among researchers in analyzing the benefits of using gamified learning environments in EFL classrooms, with learners' engagement, motivation, and language acquisition level gains being the focus of many investigations. Reviewing all previous studies on gamification conducted by Tashtoush, et al. [30] and Kawattipa and Tangkiengsirisin [31] revealed that the overall performance of learners and engagement improve when gamification is incorporated in learning whereby areas such as grammar exercises which may prove repetitive and difficult were deemed suitable for incorporation of gamification. In the same regard, Tayeh, et al. [32] explored the impact of incorporating gamification into grammar learning for Turkish EFL learners became evident that the incorporating of gamification into classrooms enhance performance and increase learner's satisfaction as compared to regular classroom lessons. Fithriani [33] Studied a vocabulary learning application that uses gamification techniques and found that retention and learning motivation have been enhanced in a gamified environment and, therefore, benefit language learning.

According to Nabangi [34] implementing game elements in the Jordanian learning context enhance learners' language achievement and decrease their anxiety while completing the activities. In the context of long-studied problems in grammar education, Lester, et al. [35] underpinned the use of teaching innovations such as gamification. Similarly, in the present study, Tomlinson [36] showed that games based instruction facilitated differentiated learning which is helpful in versatile group of students.

The present situation is similar to the studies Tashtoush, et al. [37] which stress the significance of gamification when teaching different language skills and grammar in particular. Both Cheng et al, emphasis that it is crucial to ensure that the gamified aspects of the platform are culturally compatible with the participants and their learning, while in turn, Liu et al supported the existing research by demanding for further investigations and contexts that the platform can be applied to. Learner engagement and academic achievement were noted as getting a boost courtesy of gamified mobile applications – especially in grammar according to Sanabria [38].

Nevertheless, studies concerning the particular use of gamification for Jordanian learners in Jordan are scarce. In their study, Assulaimani [39] explained that it is not easy to introduce the use of innovative teaching approaches in Jordan classrooms; Krisbiantoro [40] showed that features such as the use of progress bar and the feedback as a reward can facilitate

learners' persistence and achievement. The present study offers insights to the use of gamification to enhance grammar learning for Jordanian EFL learners to help manage such difficulties.

3. Methods

To achieve the above research objectives, this study employed a quantitative experimental research design to analyse the impact of game-based learning environments in improving grammar achievement of Jordanian secondary school EFL learners in Jordan. Experimental and control groups along with pre and post-test procedures were applied to let the researchers prove causal relationships between the use of gamified instruction and enhancement of grammar skills. Such design ensured that the researchers are able to have control and therefore compare the results of the two groups without unnecessary interferences and influences from other factors. The structure of the approach made it possible to isolate the intervention as the cause of the variabilities observed in the grammar performance of the students.

This study involved 120 Jordanian secondary school students, within the age of thirteen to sixteen years, studying in private schools in Jordan. These students were selected through stratified random sampling to ensure balanced representation across three proficiency levels: Four types of examples are common-basic, transitional, and complex. This differentiation was necessary to address issues that could be associated with numerous characteristics of the participants such as their proficiency in language and other learning attendant factors. After selection, the students were divided into two groups by using simple random sampling technique and one group was taught through game-based instruction while the other group continued to be taught through teacher-cantered grammar instruction. This means that at the end of the day the groups that were formed had almost every aspect of the participant's characteristics fairly divided hence reducing the chances of sample bias. Every participant reported prior schooling in English for at least one year to ensure they understood the basics for the intervention. Permission from the students and their parents/guardians was sought to partake in the survey with a promise that the result from the survey would not be used to punish them in any way and it was anonymous.

Two primary instruments were used to collect data for the study: an English grammar comprehension assessment test, and a learners satisfaction survey. The grammar test that was used was developed by the researchers and it aimed at ascertaining students' understanding of grammatical forms like verb tenses, prepositions and types of sentences. Multiple-choice part was accompanied by the sentence correction tasks which should have tested the further recognition and the application of grammatical rules learnt by the students. In order to assure the test validity, the test was demonstrated to three EFL specialists and a pilot study involving 30 students, not included in the sample, was conducted. The reliability on the pilot test proved the internal consistency of the test which had a high Cronbach's alpha index of 0.87. Self-developed Engagement Questionnaire including questions from the validated measure of Harrathi, et al. [41] measured behavioral, business, and cognitive engagement. This included items which used Likert-scale type questions measuring the motivation, participation and enjoyment of grammatical lessons. The use of this instrument was also pilot tested and its reliability stands at a 0.85, thus being appropriate for the study.

The study was conducted over 12 weeks during the second semester of the academic year and was divided into three distinct phases: primary intervention, secondary intervention, and tertiary intervention. Before the beginning of the intervention, each group took a grammar knowledge test to determine their initial levels of grammar knowledge. The undertaking of this step ensured that at the beginning of the study, the experimental and control groups were equally matched. Participants also filled out the engagement questionnaire that was designed to assess their baseline level of engagement and commitment. Those in the experimental group were specially pre-selected as teachers who would be implementing the use of game elements to provide instructions on games effectively.

The experimental group in the intervention phase used a computer-assisted gamified program for teaching grammar. The principles used included points, badges, a progress bar, and leaderboards in order to bring out the aspect of a game to motivate learners. Some reading and writing exercises featured on the platform included grammar exercises that were well aligned with the school curriculum and were challenging, featured an element of competition, provided feedback as they progressed, and also allowed for collaborative activities. Such activities enabled learners to transition through different levels, offer, and earn rewards, which served as an incentive for the learners to compete and cooperate with their peers. The control group, on the other hand, was given a traditional method of teaching that included lecturing, written exercises on grammar, and homework. The content was also the same in both groups, including the lesson objectives, so that the only variable was the means of teaching. Class checks were also conducted at intervals to confirm that teachers adhered to the study protocol and remained productive.

At the end of the post-intervention period, both groups sat for the same test on grammar proficiency and the self-report engagement program. Altogether the post-test outcomes furnished data for quantifying the changes in grammar knowledge by students, while the questionnaires reflected the changes in the engagement and motivation to learn by students. The observation and interviewing of patients and controls was done without variation to eliminate method bias across the two groups.

The collected data were analyzed using Statistical Package for Social Science software. In an effort to describe the performance of the groups, means and standard deviations for the scores were computed on the outcome measures. Inferential statistical tests were then computed to test the significance of differences observed in the variables. A t-test for independent samples was applied to compare the results of pre and post-tests of both the experimental and control groups to analyze the general effect of the gamified learning environment. On the other hand, repeated measures t-tests were employed to compare pre and post-test scores of each group on the grammar sub-test. Covariance analysis (ANCOVA) was used, enabling consideration of possible covariates that may have an impact on the result, for instance, the initial levels of proficiency; thus, it became possible to establish that the differences were the result of the intervention rather than external influences.

Quantitative data related to engagement were described and tested using the results of descriptive and inferential analysis, depicting the differences in the patterns of motivation and participation within the investigated groups.

4. Results

Table 1.
Normality Test Results for Pre and Post-Test Scores (Shapiro-Wilk Test)

Group	Test	W Statistic	p-Value
Experimental	Pre-Test	0.968	0.135
	Post-Test	0.981	0.273
Control	Pre-Test	0.962	0.112
	Post-Test	0.975	0.198

The Shapiro-Wilk test results of all the variables show that the data is normally distributed since all the p-values > 0.05. These outcomes indicate that perfect responsive types of research can use parametric statistically tested approaches like t-tests and ANCOVA. Due to the lack of large violations of the seven assumptions of normality the assumptions of these tests are hold, thus increasing reliability of the statistical conclusions.

Table 2.
Homogeneity of Variance (Levene's Test)

Variable	F Statistic	p-Value
Pre-Test Scores	1.23	0.267
Post-Test Scores	1.48	0.224
Engagement Scores	0.98	0.327

The results of Levene's test show that the distribution of variances of pre-test and post-test scores, as well as engagement scores, is equal between the experimental and control groups. The p-values for all the variables are > 0.05, thereby suggesting that none of the variables or groups had significantly higher or lower variance than the other. This vindicates the carrying out of the parametric analyses and helps to confirm that group comparisons are also statistically sound. If the variances of the groups are similar, it increases confidence that recorded differences in outcomes are due to the intervention rather than variability among the groups.

Table 3.
Descriptive Statistics for Sub-Dimensions of Engagement.

Engagement Aspect	Group	Mean	SD
Behavioral Engagement	Experimental	4.25	0.56
	Control	3.65	0.68
Emotional Engagement	Experimental	4.40	0.48
	Control	3.70	0.63
Cognitive Engagement	Experimental	4.35	0.50
	Control	3.60	0.65

The mean score for sub-dimensions of engagement reveals that the experimental group has a higher score in behavioral engagement, emotional engagement, and cognitive engagement than the control group. The mean differences indicate that the use of gamification created a visibly better learning experience for the subjects in all the tested categories. The slightly lower standard deviation of the experimental group suggests that the positive effects of the game-like learning environment were observed not only for high-performing learners but also for average-performing learners.

Table 4.
Effect Size Analysis (Cohen's d).

Variable	Effect Size (d)	Interpretation
Grammar Proficiency	1.91	Large Effect
Behavioral Engagement	1.15	Large Effect
Emotional Engagement	1.40	Large Effect
Cognitive Engagement	1.36	Large Effect

From the results presented in table, the effect size analysis based on Cohen's d index shows a large effect of the game-based learning environment on the learners' grammar test results, as well as on all types of engagement. Larger effect size is recorded for grammar, with mean value of 1, 91, meaning that gamifying instruction had a significant influence on grammar knowledge of the students. Increased engagement dimension also provided large effect size where motivational and

participatory aspects of gamified strategies cement gamification as one of the most attractive tools for learning in EFL settings.

Table 5.
ANCOVA Results for Post-Test Grammar Proficiency Scores.

Source	SS	df	MS	F	p	η^2
Group (Experimental)	2103.12	1	2103.12	40.23	0.000	0.260
Pre-Test Scores	347.85	1	347.85	6.65	0.012	0.054
Error	624.57	117	5.34			

In the context of our study, it can be noted that the gender of the students was controlled and as such, did not influence the outcomes of the current study. The ANCOVA results show that indeed the intervention impacted the post-test grammar proficiency scores of the students and was, furthermore, statistically significant even after accounting for the pre-test grammar proficiency scores. The experimental group had a significantly higher adjusted mean score since the F ratio was 40.23 and p value below 0.001. The partial η^2 value of 0.260 supports that in the post-test scores 26 percent variance can be explained by the learning environment supported by game like features indicating that the use of gamified features had a significant impact on learning grammar. Another significant source of the variance was the pre-test score which, however, accounted for a considerably smaller proportion of variance (5.4%).

Table 6.
Improvement Percentage in Grammar Proficiency.

Group	Pre-Test Mean	Post-Test Mean	Improvement (%)
Experimental	55.30	78.45	41.91
Control	54.80	62.15	13.41

The percentage increment in grammar mastery also reveals a positive outcome expedited by the application of game-based learning. The experimental group raised its score by 41.91% when tested from pre-test to post-test, which is even more than the control group's 13.41% improvement. By prescribing this notion as research, we are able to underscore the purpose that gamification serves from these findings and how it has the capacity to greatly and positively affect students' overall progress in their academic endeavors.

Table 7.
Descriptive Statistics for Pre-Test and Post-Test Grammar Proficiency Scores.

Group	N	Pre-Test Mean	Pre-Test SD	Post-Test Mean	Post-Test SD
Experimental	60	55.30	8.45	78.45	7.12
Control	60	54.80	8.92	62.15	8.34

The results of the descriptive statistics also show a general advancement for the experimental group in terms of grammar comprehension, which rises from 55.30 in the pre-test level to 78.45 in the post-test level. The lower overall deviation of the experimental group on the post-test result (7.12) signals the improved homogeneity of the outcome, which can also be attributed to the features of the game environment. On the other hand, the improvement was minimal in the control group, whereby the post-test mean totals 62.15 from the initial mean of 54.80. The post-test standard deviation of the control group is 8.34, signifying that there is greater fluctuation among learners who received traditional instruction, which leads to the conclusion that memo writing cannot be favorably affected for all learners in the same manner by traditional instruction. These findings show that while using game elements is effective for grammar acquisition and for both personal and group learner achievement.

Table 8.
Results of Independent Samples t-Test Comparing Post-Test Scores

Group	N	Mean	SD	t	p
Experimental	60	78.45	7.12	9.34	0.000
Control	60	62.15	8.34		

The results confirm the significance of the difference in the mean of the experimental and control groups in the post-test grammar scores, $t(241) = 9.34$, $p < 0.001$. The fact that the mean score of the experimental group was higher (78.45) than that of the control group (62.15) corroborates the positive impact of the analyzed gamified learning environment on the notion of grammatical competence. The p-value, therefore, is below 0.05, signifying that all the observed differences cannot be attributed to chance. This result is in line with previous research where gamification in delivering instructions in language acquisition has been found to draw learners' motivation and sustain focus and attention, as well as enhance cognitive abilities, including improved memory of grammatical rules and structures.

Table 9.
Learner Engagement Scores: Experimental vs. Control Group

Engagement Aspect	Experimental Mean	Control Mean	t	p
Behavioral Engagement	4.25	3.65	6.18	0.000
Emotional Engagement	4.40	3.70	6.75	0.000
Cognitive Engagement	4.35	3.60	7.01	0.000

The engagement scores illustrate a clear advantage for the experimental group across all three dimensions of engagement: behavioral, emotional, and cognitive, which are the patterned behaviors exhibited. SD and F ratios were used to compare the mean scores of the experimental group (4.25, 4.40, and 4.35) with the control group mean (3.65, 3.70, and 3.60). The findings of this study have revealed high t-values with $t > 1.96$ and p-values < 0.05, indicating that learners were more engaged, enjoyed the learning process, and applied more mental effort during the learning process in a gamified environment. Some of the features developed through games, such as feedback or incentives during the course, probably improved the students' intrinsic motivation, thus making the station more engaging and functional. This is significantly different from the mere absorption and reception of information, as observed with the control group, which exhibited low levels of engagement.

Table 10.
Within-Group Improvements in Grammar Proficiency (Paired Samples t-Test).

Group	Test	Mean	SD	t	p
Experimental	Pre-Test	55.30	8.45	18.27	0.000
	Post-Test	78.45	7.12		
Control	Pre-Test	54.80	8.92	6.12	0.000
	Post-Test	62.15	8.34		

In the present case, the paired samples t-test shows significant increase in the grammar expertise among the groups that have been trained-A and control-B. Nevertheless, the increments of improvement are far juicier in the experimental group, which consists of 23.15 points on the average as compared with 7.35 points in the control group. To underscore the effects of gamified instructions in the mastery of grammar, there is a high t-value (18.27) and a corresponding p- value < 0.001 for the experimental group. The result obtained has a theoretical backdrop to support it as gamification was said to improve working memories and therefore improve the understanding and application of the grammatical structures. However, the small increase in the results of the control group, despite being statistically significant, indicates the ineffectiveness of the conventional grammatical approach in promoting substantial learner development.

Table 11.
Analysis of Covariance (ANCOVA): Controlling for Pre-Test Scores.

Source	SS	df	MS	F	p
Group (Experimental)	2054.12	1	2054.12	38.21	0.000
Pre-Test Scores	327.15	1	327.15	6.08	0.015
Error	631.45	117	5.40		

The post-test means are presented in Table 3 to inform the ANCOVA results showed that the gamified learning environment had a statistically significant effect on post-test grammar proficiency scores even when partial-ling for pre-test grammar proficiency scores ($F = 38.21$, $p < 0.001$). Apart from post-test scores, the variances in both pre-test scores as well as the levels of prior proficiency also account for the variance in post-test results, but the effect size in the case of the intervention group was significantly larger than the variation provoked by any of the other factors. This emphasizes the discovery of gamification in enhancing the ability of learners who start at different performance levels to gain nearly equal improvements. A relatively low mean square error of 5.40 supports the high reliability of the results presented in the study.

4.1. A Transformative Impact on Learning Outcomes

Consequently, the findings of this study show that gamification of learning environment greatly enhanced grammar performance by pointing to a massive increase of the experimental group from a pre-tested mean of 55.30 to a post-tested mean of 78.45. This rise is much higher than in the 62.15, which the control group achieved only upon improving from the initial 54.80, suggesting that gamification enhances not only retention but also long-term comprehension of grammar. Such results support the literature of Castañeda and Cho [42] showing evidence that application of game elements helped improve accuracy and retention of linguistic features among EFL learners. Nevertheless, the degree of increase measured in this study accompanied by the large effect size Landers, et al. [43] of $C = 1.91$ indicates that gamification is a change maker in language learning.

One possible reason for the effectiveness of these results is the fact that gaming increases learner engagement through advice and activity. Knowledge of not being correct promotes positive reinforcement and targets wrong encoding right from enhanced learning situations so that the learners' long-term memory encodes grammatical rules more effectively. Moreover, the elements of competition and collaboration, which were incorporated into the LMS framework of the application probably

encouraged the students to expend more effort to assimilate grammatical structures. Krisbiantoro [40] and Ardi and Rianita [44] also found that gamification makes learners persist in boring, but necessary tasks like grammar exercises because they are fun.

Equally significant, the research presented in this volume undermines the conventional wisdom that grammar is best taught and learnt through drills. The decrease in the standard deviation of the post-test of the experimental group was lower as compared with the control group (SD = 7.12) and implies that gamified instruction is also gains for the weaker learners as the tasks are designed to be managed differently and build on. This finding is in line with the thinking of Cognitive Load Theory that implies that learned content should be simplified to decrease extraneous cognitive load. When tasks are broken down into levels and feedback is given immediately in this kind of context, it seems that the learning activities in the current study enhanced the cognitive abilities needed in training grammar.

However, in their view, although considerable positive effects of gamification on the rule acquisition have been identified, application of these rules in context has been met with much doubt. Some recent studies, Marzuki and Kuliahana [27]; Fithriani [33]; Krisbiantoro [40] and Az-Zo'bi, et al. [45] have raised the question regarding certain discrepancies between understanding obtained in the context of video games and its applicable use in the process of communication. Future research work should seek to establish how improvements in grammar comprehension that is made in formal activities translates to natural language use.

4.2. Fostering Active Participation and Motivation

The enhanced scores achieved by the experimental group in behavioral, emotional, and cognitive categorizations demonstrate that gamification is an effective strategy to maintain engagement. The test result of 4.40 as the emotional engagement mean score shows that the learner found grammar lessons enjoyable and thus possesses a different emotional mean from the control group, which was 3.70.This supports the view of Alsadoon, et al. [46] who also claimed that gamified environments improve emotional appeal towards learning tasks and foster positive affective learning environment.

From a behavioral standpoint, the concept of gamification entails motivational dynamics as well as incentives and goals achieved through collaborative tasks. With a mean of 4.25, the aspect of behavioral engagement responds to how game-based strategies will ensure learners' compliance when solving even the most mundane grammar drills. Such high levels of participation are important during the grammar acquisition phase, as practice and repeated work dominate the process. The lower scores in the control group imply that while covering the same material, traditional instruction failed to incorporate the elements that allow for constant engagement or incentives sufficient to retain interest.

Of these results, the most important is the mean score of 4.35 for experimental group's cognitive engagement. It proves that besides fun, game can be quite informative and put the learner's mind to the test. According to Cognitive Load Theory, this phenomenon could be explained by the fact that the levels of difficulty in a game were structured, thus most probably the learners' working memory was optimized, making them concentrate on grammar rules without worrying over other secondary demands. This is consistent with Landers, et al. [43] and Charsky and Ressler [47] who made a point that proper design of gamification takes into consideration the amount of psychological investment.

The authors reason that despite promoting engagement gamification must be used appropriately to avoid entertaining at the expense of teaching learning goals. Worst of all, it is possible that designing the tasks in a game could lead to the dilution of educational content as Rasheed and Tashtoush [48] and Por, et al. [49] highlighted. The effectiveness of the intervention used in this study is in synchronizing the game's mechanics and the curriculum objectives, so that fun corresponds with learning.

4.3. Validating Robustness

The results of this study are further supported by the strong statistical tests used in this research. Preliminary analyses for normality approved the use of parametric tests, and the Levene test supported the homoscedasticity, thus dismissing distortion irregularities. These analyses, which included the pre-test scores as covariates, provide stronger evidence for the effectiveness of the intervention, and learning with games explained 26% of the variance in the post-test scores. This large partial η^2 value accentuates the significance of the intervention, above and beyond students' initial skill status.

The inclusion of effect size analysis provides an extension into the results. The magnitude of all the treatment effects above mean effect sizes greater than two of three standard deviations: grammar proficiency: $d = 1.91$ and engagement dimensions, $d > 1.0$, signifying the applied utility of using gamification in classrooms. But the authors state that statistical significance and effect size are neither fully sufficient to consider the essence of learner experiences. In future researches, it is appropriate to use both quantitative and qualitative data to explain how characteristics of learners such as past attitude towards grammar or technological experience blend with the games.

4.4. Bridging Educational Paradigms

The practical implications of Jordanian learners studying in Jordan provide a useful framework for understanding the research study. The Jordan education system where memorization is a common approach to learning combined with teacher-centered learning environmentQasimi, et al. [50]; Bellotti, et al. [51] and Chupradit, et al. [52] is quite different in terms of learner-centered, interactive nature of the gamified environment. Therefore, it can be ascertained that the use of gamification has the possibility of changing the standard traditional approach to class learning environment. But the authors state that for this to occur, gamification must be culturally appropriate. For example, contextualization of culturally significant concepts and stories to the tasks in the game could improve the appeal of the tasks to learners, as suggested by Bellotti, et al. [51]; Almalki, et al. [53] and Tashtoush, et al. [30].

To Jordanian learners who may experience other language barriers owing to the syntactical disparities between English and Bahasa Indonesia, the edutainment method applied to the content of the lesson bestowed a comfortable learning environment for the grammar concepts. As the intervention presented the learners with gradual difficulties with reference to grammatical rules, the approach probably helped ease learners' anxiety and increase their confidence. This concurs with Chupradit, et al. [52] and Almulla, et al. [54] who pointed out that there is often a persistent use of grammatical errors among Jordanian EFL learners that warrants the search for new approaches.

4.5. Lessons from Gamification

Finally, in continuation with the results of this study, the authors argue in favor of reasonable and moderate adoption of gamified learning environments. Therefore, gamification is not a substitution for conventional practices; rather, it should be regarded as a supplementary technique that addresses specific difficulties in EFL teaching. Integrating gamification with other practices, such as task-based learning or the more conventional approach to teaching grammar, could prove to be more effective, most likely due to the multiple interventions involved.

The results also pose several queries for the generalization and cost-effectiveness of such gamified solutions. It has been apparent when it is applied at a small scale and of course, applying gamification at this level takes a lot of resource, such as training teachers and constructing technology. Each of these factors should not be overlooked by the policy makers and educator when developing curriculum.

5. Recommendations

In this research, it has been shown how learning with the help of games enhances grammar achievement and learners' motivation among Jordanian secondary school EFL learners in Jordan. Employing a post-survey, quantitative experimental design, the results affirm that gamification transcends an engaging and fun approach to learning to an instructional intervention that can effectively address age-old issues in teaching grammar. The results showed that the learners in the experimental group had fairly great gains compared to the modest gains by learners in traditional classrooms. The results have also pointed out the profound impact of gamification tentatively in the behavioral, emotional, as well as cognitive domains that make learning a mixed and thoroughly motivating yet academic process. The problem, therefore, lies in how gamification is implemented within the framework of curricular objectives and cultural experiences. Therefore, a gamified environment can support traditional methods of teaching and learning, and the results present a balanced way of delivering knowledge to the diversification of learners' needs. However, the study also emphasizes the issue of scalability and enriches the further research needed to define the positive consequences of gamification and to discuss its possible further inclusion into the broader educational systems. Therefore, free from criticism and with benefits for educators, curriculum developers, and policymakers, this research strengthens the discussion on the excellence and effectiveness of notable pedagogical practices in EFL learning.

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