

Transformative Impacts of ICT-Based Gamification on English Language Teaching in Moroccan Education: A Quasi-Experimental Study

Mr. Ahmed Ennouari¹, Dr. Khalid Houssaini²

¹Doctoral Student, FLSH, USMBA, Fes

²ENCG - USMBA, Fes

Abstract

In response to the evolving demands of language education, especially within the context of Moroccan academia, this study investigates the integration of Information and Communication Technology (ICT)-Based gamification in English Language Teaching (ELT). With the growing need for English proficiency, educators and policymakers seek innovative strategies to enhance language instruction. This research, employing a robust quasi-experimental design, explores the impact of ICT-Based gamification on English language proficiency in Moroccan educational settings. Utilizing digital contexts such as mobile apps and online platforms, the study scrutinizes the practical implementation of gamified teaching methods, exemplified by tools like "Kahoot." A comparative analysis between a control group following traditional instruction and an experimental group immersed in ICT-based gamification forms the crux of this investigation, aiming to unveil its true effectiveness and transformative potential. The study's findings highlight the multifaceted benefits of ICT-based gamification, elucidating its impact on students' motivation, comprehension, achievements, and classroom behavior in English language learning. Beyond contributing to language teaching discourse, this study offers practical guidance for Moroccan educators and policymakers, presenting avenues to optimize English teaching methodologies within the dynamic, globalized digital educational landscape. In a world where linguistic competence and technological proficiency are integral, the seamless integration of ICT-based gamification emerges as a promising avenue to enhance English language understanding, elevate motivation, minimize disruptive behaviors, amplify learning outcomes, and reshape the pedagogical landscape in Moroccan education.

Keywords: ICT-Based Gamification, English Language Teaching, Moroccan Education, Pedagogical Transformation, Quasi-Experimental Study.

I. Introduction

In response to the evolving demands of language education, especially within Morocco's academic landscape, there has been a significant shift toward innovative teaching approaches, particularly focusing on enhancing English language instruction. This transformation is vital as the demand for English proficiency rises, prompting educators and policymakers to explore creative strategies. Among these, the

integration of Information and Communication Technology (ICT)-Based gamification emerges as a powerful catalyst for pedagogical change. This study, employing a robust quasi-experimental methodology, thoroughly explores the impact of ICT-Based gamification on English language proficiency in Moroccan educational settings. The research delves into the practical implementation of gamified teaching methods, utilizing digital contexts such as mobile apps, online platforms, and tools like "Kahoot."

The core of the study involves a meticulous comparative analysis between a control group, exposed to traditional language instruction, and an experimental group immersed in ICT-based gamification. This assessment aims to uncover the true effectiveness of this innovative approach and its potential to revolutionize the educational experience. The findings highlight the multifaceted benefits of integrating ICT-based gamification, offering critical insights into its transformative influence on students' motivation, comprehension, achievements, and classroom behavior in English language learning. The study not only contributes to the academic discourse in language teaching but also serves as a practical guide for Moroccan educators and policymakers, providing a roadmap to optimize English teaching methodologies in alignment with the dynamic, globalized digital landscape of education.

In a world where linguistic competence and technological skills are crucial for effective communication and professional success, the seamless integration of ICT-based gamification emerges as a promising avenue. The research underscores the remarkable potential of this innovative approach to elevate learners' English language understanding, increase motivation, reduce disruptive behaviors, enhance overall learning achievements, and reshape the pedagogical landscape within Moroccan education.

1.1. Background and Context

The Moroccan academic context is experiencing a growing demand for proficient English language skills due to globalization and the country's aspirations for socio-economic development and improved international collaboration. English proficiency is crucial in various sectors, including business, technology, academia, and diplomacy. Traditional teaching methods face challenges in engaging students and motivating them to attain proficiency. A paradigm shift towards innovative teaching approaches, such as ICT-based gamification, has emerged as a promising avenue to transform language pedagogy. Gamification, which combines game-like elements with non-game contexts, offers a dynamic platform to revitalize language learning. This approach aligns with the increasing prevalence of technology and digital platforms among Moroccan students, complementing their digital fluency and addressing the need for innovative, engaging methodologies in the pursuit of English language proficiency. Exploring the integration of ICT-Based Gamification in Moroccan educational settings is essential to assess its potential in enhancing English language teaching and learning outcomes.

1.2. Problem Statement

In the context of English language teaching within Moroccan educational settings, traditional methodologies encounter challenges in engaging and motivating students, leading to limited proficiency and disinterest in language acquisition. The need for innovative, effective teaching strategies to enhance English language proficiency among Moroccan students is evident. While Information and Communication Technology (ICT) integration has shown promise in educational contexts, its specific application in English language teaching, particularly through gamification, requires thorough investigation and empirical validation.

1.3. Significance of the Study

The significance of this study lies in exploring the potential of ICT-Based Gamification as a transformative approach to English language teaching within Moroccan educational institutions. This innovative integration aims to address existing challenges by offering a dynamic, interactive, and engaging learning environment that aligns with students' digital fluency. Understanding the impact and effectiveness of ICT-Based Gamification in fostering English language proficiency is crucial for educators, policymakers, and stakeholders to optimize teaching methodologies and cater to the evolving needs of language learners.

1.4. Research Objectives

1. To assess the effectiveness of ICT-Based Gamification in improving English language proficiency.
2. To evaluate the impact of ICT-Based Gamification on student motivation and engagement in English language learning.
3. To investigate the influence of ICT-Based Gamification on student behavior and participation in the language classroom.
4. To provide insights into the practical implementation of ICT-Based Gamification and its integration into the English language curriculum in Moroccan educational settings.

1.5. Research Questions

1. How does the integration of ICT-Based Gamification influence English language proficiency among Moroccan students?
2. What are the effects of ICT-Based Gamification on student motivation and engagement in English language learning?
3. How does ICT-Based Gamification impact student behavior and participation in English language classrooms?
4. What are the practical considerations and challenges in implementing ICT-Based Gamification in Moroccan educational institutions?

1.6. Research Hypotheses

1. The integration of ICT-Based Gamification significantly improves English language proficiency compared to traditional teaching methods.
2. ICT-Based Gamification enhances student motivation and engagement, leading to increased interest and active participation in English language learning.
3. Students exposed to ICT-Based Gamification exhibit more positive behavior and greater involvement in language learning activities compared to those in traditional instructional settings.
4. The successful implementation of ICT-Based Gamification in English language teaching depends on factors such as technological accessibility, teacher training, and curriculum alignment.

II. Literature Review

Language education is a dynamic field that continuously adjusts to meet the changing needs of students in our globally interconnected and digitized world, necessitating constant adaptation to stay on the development track (Santosa, Harismayanti, & Putra, 2022). The importance of creating educational games tailored to specific English teaching contexts has been emphasized in recent literature (Santosa,

Harismayanti, & Putra, 2022). Language pedagogy, the practice of teaching languages, has witnessed significant transformations, particularly focusing on innovative teaching approaches to enhance English language instruction (Guo, 2020). This evolution is particularly relevant in Morocco, where the demand for English language proficiency is steadily increasing (Guo, 2020). In response, educators and policymakers in Morocco are exploring creative strategies to optimize English teaching methods (Guo, 2020). One innovative approach gaining significant attention is the integration of Information and Communication Technology (ICT)-Based gamification (Dicheva, Dichev, Agre, & Angelova, 2015). This comprehensive literature review aims to delve into the theoretical framework and practical implications of ICT-Based gamification within the Moroccan educational context.

2.1. Evolution of Language Approaches

The field of language evolution and human cognitive evolution, though criticized for lacking scientific rigor, has seen increased interest in recent decades (Pinker & Bloom, 1990; Dunbar, 1996; Carstairs-McCarthy, 1999; Hauser, Chomsky, & Fitch, 2002; Christiansen & Kirby, 2003; Pinker & Jackendoff, 2005; Számádó & Szathmary, 2006; Fitch, 2010; Tallerman & Gibson, 2011; Yang, 2013; Berwick, Friederici, Chomsky, & Bolhuis, 2013). This surge aligns with significant advancements in understanding this multidisciplinary issue (Fitch, 2017). Despite skepticism, progress in comprehending cognitive evolution has been substantial (Hauser et al., 2014; Lewontin, 1998). Meanwhile, language education is evolving rapidly to meet global demands, emphasizing innovative approaches influenced by technological developments like ICTs and motivational methods such as gamification (Botha, 2021). This evolution is particularly relevant in Morocco, where the demand for English proficiency is rising (Jebbour, 2021). Recognizing English as a global lingua franca and an essential skill in the digital age, Morocco is reevaluating language education approaches, emphasizing innovation and the integration of new technologies like smartphones (Morchid, 2019).

2.2. ICT-Based Gamification Evolution

The evolution of ICT-based gamification in education, involving the application of game elements in non-game contexts, has garnered significant attention (Deterding et al., 2011; Hamari et al., 2014). Gamification is increasingly used to enhance motivation, engagement, and learning outcomes in education (Anderson et al., 2010; Caponetto et al., 2014), with roots traced back to the early 21st century coinciding with technology integration in classrooms (Deterding et al., 2011; Gee, 2003). Leveraging Information and Communication Technology (ICT), gamification utilizes digital tools, mobile apps, and online platforms to create immersive learning experiences (Hamari et al., 2014; Steinkuehler & Duncan, 2008). As the demand for digital literacy and 21st-century skills grows, the evolution of ICT-based gamification becomes increasingly relevant (Prensky, 2001). This approach aims to address the needs of digitally native students, preparing them for a technology-driven world (Deterding et al., 2011; Hamari et al., 2014). Research in this field explores the impact of ICT-based gamification on motivation, comprehension, achievements, and classroom behavior, often through comparative studies against traditional teaching methods (Anderson et al., 2010; Caponetto et al., 2014). In conclusion, the dynamic evolution of ICT-based gamification reflects an adaptive response to the digital age, offering a promising avenue to enhance motivation, engagement, and learning outcomes, ultimately equipping students for success in a technologically driven world.

2.3. ICT-Based Gamification Evolution in Morocco

The integration of ICT-based gamification in Moroccan education aligns with a global trend toward leveraging digital technology to modernize learning experiences (Babori, Zaid, & Fassi, 2019). Morocco's commitment to updating its educational system and equipping students for the digital age is evident in the evolution of ICT-based gamification, reflecting a growing interest in innovative educational approaches (Babori, Zaid, & Fassi, 2019). In the Moroccan context, gamification elements in learning content have emerged as a promising strategy to enhance student motivation and language learning, in line with the nation's dedication to incorporating technology into classrooms (Mimouni and Tamer, 2020).

Facing the challenge of preparing students for the demands of the 21st century, where digital literacy is crucial, Morocco sees ICT-based gamification as a promising solution (Ait Hammou & Elfatihi, 2019). This approach, integrating game design, digital tools, and interactive platforms into the curriculum, aims to create engaging and motivating learning environments, contingent on teachers' skills in integrating ICTs and games (Benali, Kaddouri, & Azzimani, 2018). However, successful implementation faces challenges, including the need for teacher training in gamified approaches and exploring cultural factors influencing adoption (Benhadj, El Messaoudi & Nfissi, 2019; Dehbi, Dehbi, Bakhouyi & Talea, 2023). Despite challenges, the evolution of ICT-based gamification in Morocco is supported by growing technological infrastructure and increased access to digital resources (Ouatiq, Riyami, Mansouri, & Qbadou, 2019). Emerging research in the Moroccan context focuses on understanding the benefits and challenges of ICT-based gamification, emphasizing the need for context-specific strategies to fully harness its potential (Ouahbi, Darhmaoui & Kaddari, 2021). In conclusion, Morocco's exploration of ICT-based gamification responds to the global demand for digital skills in education, with educators actively adopting this innovative approach to enhance learning experiences and prepare students for the digital future.

2.4. Theoretical Framework

The theoretical framework underpinning this literature review combines theories of language education, gamification, and technological integration. The theoretical foundations draw from language pedagogy, such as the principles of effective language instruction (Burns & Richards, 2012). Additionally, the framework includes gamification theories, which focus on the application of game elements to non-game contexts (Deterding et al., 2019). Furthermore, the integration of Information and Communication Technology (ICT) into this theoretical framework is vital, as it forms the basis for the innovative teaching approach of ICT-Based gamification. The combination of these theoretical perspectives provides the foundation for understanding the potential impact of ICT-Based gamification on English language proficiency in Moroccan educational settings.

III. Research Methodology

3.1. Research Design

This study employs a quasi-experimental research design to investigate the impact of ICT-Based gamification on English language proficiency within Moroccan educational settings. A quasi-experimental design allows for a comparative analysis between the control group and the experimental group to assess the effectiveness of the innovative approach. The study aims to determine the causal

relationship between the integration of ICT-Based gamification and improvements in English language learning motivation, understanding, achievements, and classroom behavior.

3.2. Participants and Instruments

The participants in this research includes 54 students in Moroccan high school. The students are divided into two equal groups of 27 each as explained below:

- **Control Group (27 students):** This group received traditional language instruction. These students were selected based on specific criteria, such as English language proficiency and classroom behavior. The control group served as a baseline for comparison.
- **Experimental Group (27 students):** This group was exposed to ICT-Based gamification methods. They were engaged in English language learning activities that incorporate digital tools, mobile apps, online platforms, and gamified approaches. Like the control group, students in the experimental group were also selected based on specific criteria to ensure reasonable comparability.

3.3. Instruments

In this academic article, the term "instrument" encompasses a variety of tools and methodologies used for data collection, analysis, and interpretation, contributing to the comprehensive findings presented. The Statistical Package for the Social Sciences (SPSS) is a key instrument employed for rigorous statistical analyses, including ANOVA tests, to evaluate the impact of ICT-Based gamification on educational outcomes. Educational ICT-based games, such as those from Games to Learn English and Duolingo, are integral components for engaging learners and assessing language proficiency, comprehension, and motivation (Annexe 1). Surveys and questionnaires (Annexe 2) serve as valuable instruments for gauging qualitative aspects, providing insights into students' experiences and teachers' perceptions. The article adopts a triangulation approach in its methodology, combining data from various instruments, including test scores, observations, interviews, and attendance records, to ensure a robust and multifaceted exploration of ICT-Based gamification's integration in language education.

3.4. Data Collection

Data was collected through a combination of quantitative and qualitative methods to gain a comprehensive understanding of the impact of ICT-Based gamification.

- **Pre- and Post-Testing:** Both the control and experimental groups were subjected to pre- and post-tests to measure their English language proficiency and ensure that they have the same level and conditions. The same test was administered to both groups periodically to assess any changes in their English learning comprehension, achievement in addition to observing their behaviors overtime.
- **Surveys and Questionnaires:** Students in the experimental group will be asked to complete surveys and questionnaires to gauge their motivation, engagement, and classroom behavior in response to the gamified teaching approaches. These surveys will include Likert-scale questions and open-ended items to collect both quantitative and qualitative data.
- **Classroom Observations:** Observations were conducted in both the control and experimental classrooms to assess students' behavior, interaction, and engagement. This qualitative data was collected through direct observation and field notes.

- **Teacher Interviews:** Interviews with teachers who implement ICT-Based gamification in the experimental group were conducted to gather insights into their experiences, challenges, and perceptions of the approach. These interviews will provide valuable qualitative data.
- **Students’ Performance Data:** Academic performance data, including test scores and assessments, were collected and analyzed to determine the impact of ICT-Based gamification on students’ achievements.
- **Attendance Records:** Attendance records were examined to identify any patterns in student attendance and its correlation with the use of gamified teaching approaches.

3.5. Data Analysis

Data analysis involves a combination of quantitative and qualitative methods to address the research questions and hypotheses.

- **Quantitative Analysis:** Pre- and post-test scores for English language proficiency in the control and experimental groups were analyzed using statistical method ANOVA. Survey data were quantitatively analyzed to measure changes in motivation and classroom behavior. Students’ performance data and attendance records were subject to statistical analysis to determine the impact of ICT-Based gamification on achievements and attendance patterns.
- **Qualitative Analysis:** Qualitative data from open-ended survey items, classroom observations, and teacher interviews were subjected to thematic analysis. Themes related to motivation, comprehension, achievements, classroom behavior, and teacher experiences were identified.
- **Comparative Analysis:** The study has conducted a comparative analysis between the control group and the experimental group to determine the extent to which the integration of ICT-Based gamification impacts English language proficiency, motivation, comprehension, achievements, and classroom behavior.
- **Triangulation:** The study has employed triangulation technique by cross-referencing findings from multiple data sources including test scores, surveys, observations, and interviews, to ensure the reliability and validity of the results.

The research design, participants, data collection methods, and data analysis plan will enable a comprehensive investigation of the impact of ICT-Based gamification on English language proficiency in Moroccan educational settings. The combination of quantitative and qualitative data will provide a well-rounded view of the research questions and hypotheses, offering valuable insights into the benefits and challenges of this innovative pedagogical approach.

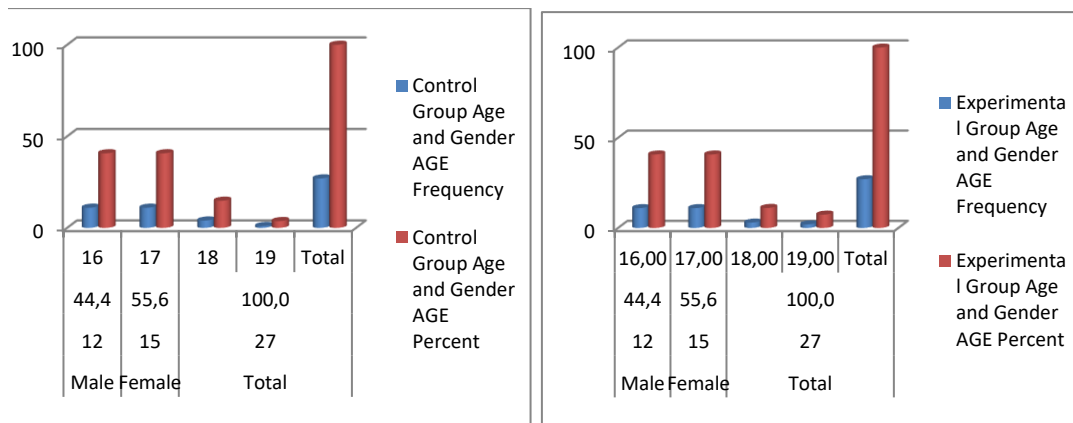
IV. Findings

The findings of this study shed light on the impact of ICT-Based gamification on English language proficiency, motivation, comprehension, achievements, and classroom behavior within Moroccan high school students. The research was conducted using a quasi-experimental design with both a control group and an experimental group. The study involved 54 students, equally divided into two groups of 27 students each class, with consideration of demographic,(age and gender), balance between them as illustrated below (table 1) and (graphs 1&2):

Statistics				
	Gender	Age	Gender	Age

N	Valid	27	27	27	27
Mean		1,56	16,81	1,5556	16,8519
Std. Deviation		,506	,834	,50637	,90739
Percentiles	25	1,00	16,00	1,0000	16,0000
	50	2,00	17,00	2,0000	17,0000
	75	2,00	17,00	2,0000	17,0000

Table 1: students' gender and age similarities between controlled and experimental groups



Graphs 1&2: Showing students' gender and age similarities between controlled and experimental

4.1. English Language Proficiency

The analysis of pre- and post-test scores for English language proficiency reveals that the experimental group, exposed to ICT-Based gamification, exhibited a statistically significant improvement in their English language proficiency compared to the control group. The one way ANOVA results indicate a clear and positive impact of ICT-Based gamification on students' language proficiency, as illustrated below (Table 2):

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
Experimental Group Pretest Grades x/20	Between Groups	100,033	9	11,115	3,636	,011
	Within Groups	51,967	17	3,057		
	Total	152,000	26			
Experimental Group Posttest Grades x/20	Between Groups	63,074	9	7,008	2,609	,042
	Within Groups	45,667	17	2,686		
	Total	108,741	26			

Table 2: Results of one way ANOVA for pretest and post-test of the EXPERIMENTAL group.

Interpretation: For the experimental group, there are significant differences in both pretest and posttest grades between groups, as indicated by the significant F-statistics and p-values (0.011 for pretest, 0.042 for posttest). This suggests that the experimental treatment had an effect on both pretest and posttest

performance. Hence, the average scores of the experimental group has increased significantly after the implementation of gamified teaching approaches;

While the ANOVA test on control group in pretest and post test showed no significant improvement as showed below (table 3):

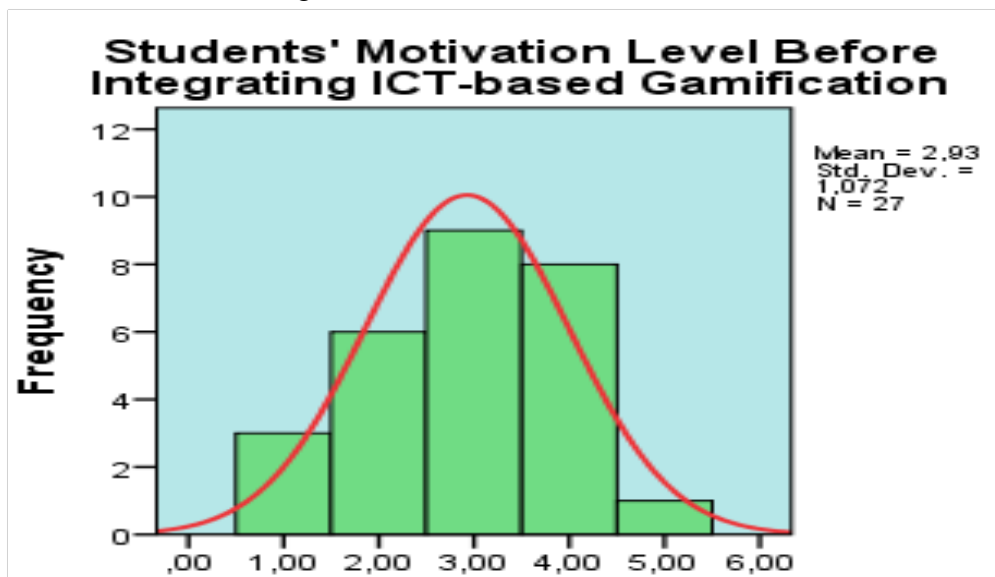
ANOVA : Control Group Pre-test Grades x/20					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	162,000	10	16,200	9,042	,000
Within Groups	28,667	16	1,792		
Total	190,667	26			
ANOVA: Control Group Post-test Grades x/20					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	80,405	8	10,051	1,641	,182
Within Groups	110,262	18	6,126		
Total	190,667	26			

Table 3: Results of one way ANOVA for pretest and post-test of the CONTROL group.

There are no significant differences in posttest grades between groups, as indicated by the non-significant F-statistic (1.641) and a p-value of 0.182.

4.2. Motivation

Surveys and questionnaires completed by students in the experimental group show a notable increase in motivation for English language learning. The Likert-scale questions and open-ended responses consistently reflect a higher level of motivation among these students. They express greater enthusiasm for learning English through gamified activities, attributing this motivation to the engaging and interactive nature of the ICT-Based gamification methods.



Graph 3: Students' motivation before ICT-based gamification integration

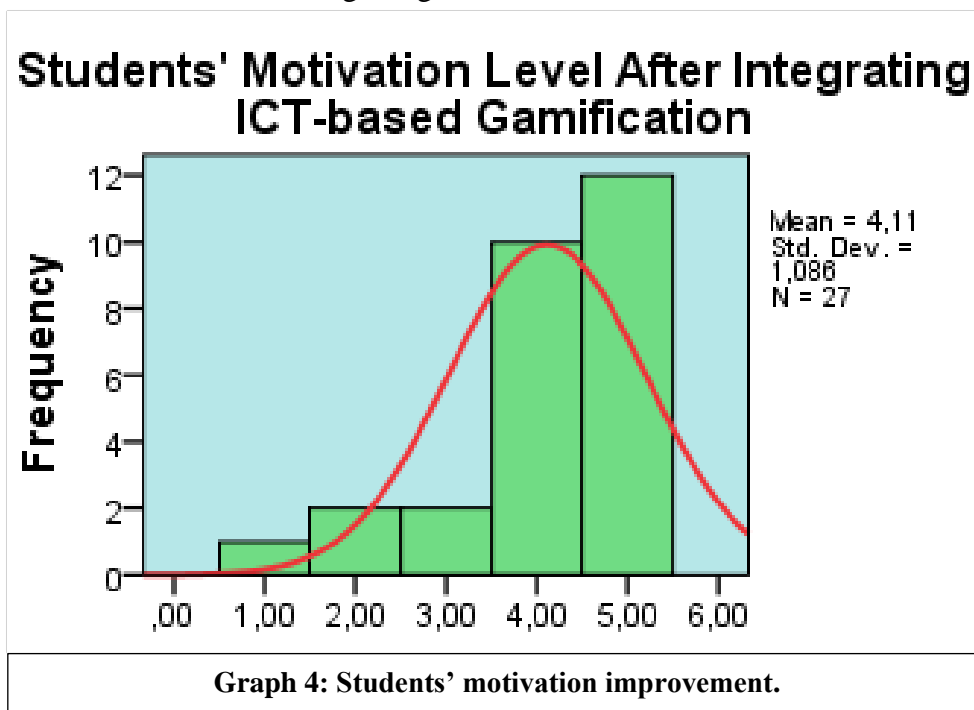
a) Descriptive Statistics

➤ Students' Motivation Level Before Integrating ICT-based Gamification:

- Very low: 11.1%
- Low: 22.2%
- Average: 33.3%
- High: 29.6%
- Very High: 3.7%

The data indicate a relatively balanced distribution of students' motivation levels before the integration of ICT-based gamification. The majority fall within the "Average" and "Low" categories, with a notable percentage in the "High" category.

➤ Students' Motivation Level After Integrating ICT-based Gamification:



- Very low: 3.7%
- Low: 7.4%
- Average: 7.4%
- High: 37.0%
- Very High: 44.4%

After the integration of ICT-based gamification, there is a noticeable shift in students' motivation levels. A significant proportion of students now fall within the "High" and "Very High" categories, indicating a positive impact on motivation following the implementation of ICT-based gamification. The percentages for "Very Low," "Low," and "Average" categories have decreased.

Overall, these results suggest that integrating ICT-based gamification has had a positive influence on students' motivation levels, with a notable increase in the number of students reporting higher motivation levels as detailed below (table 4):

b) ANOVA Method

ANOVA : Students' Motivation Level After Integrating ICT-based Gamification							
		Sum of Squares	df	Mean Square	F	Sig.	
Between Groups	(Combined)	21,903	4	5,476	13,746	,000	
	Linear Term	Unweighted	9,452	1	9,452	23,728	,000
		Weighted	15,087	1	15,087	37,874	,000
		Deviation	6,816	3	2,272	5,703	,005
Within Groups		8,764	22	,398			
Total		30,667	26				

Table 4: The ANOVA results for students' motivation levels after integrating ICT-based gamification

Interpretation:

The ANOVA results for students' motivation levels after integrating ICT-based gamification show statistically significant differences between the groups. The overall F-statistic is significant (Sig. = 0.000), indicating that there are significant differences in motivation levels among the groups.

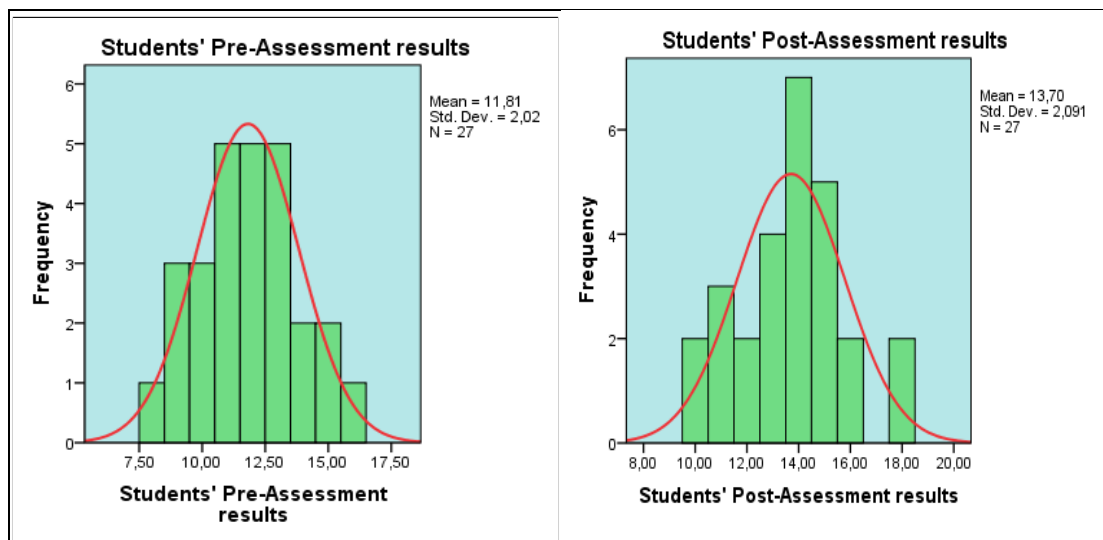
- The linear term (both unweighted and weighted) and deviation components contribute significantly to the overall differences in motivation levels.
- The deviation analysis further suggests that not all groups have the same mean, indicating variations among different conditions or categories.

In summary, the ANOVA results provide strong evidence that the integration of ICT-based gamification has a statistically significant impact on students' motivation levels, with differences observed among the groups.

4.3. Comprehension

a) Descriptive Statistics

The analysis of comprehension, measured through assessment performance data, shows that students in the experimental group outperformed their counterparts in the control group as the graphs (3&4) below depicted:



Graphs 5&6: Students' Pre-test and post-test Comprehension Assessment Results

The use of gamified approaches, which included digital tools, mobile apps, and online platforms, facilitated a deeper understanding of English language concepts and vocabulary. These students demonstrated a more profound grasp of the language as reflected in their test scores and assessments.

b) ANOVA Analysis

The data represents the results of an Analysis of Variance (ANOVA) conducted on students' comprehension pre-assessment results. Here's the interpretation:

ANOVA : Students' Post-Assessment results							
		Sum of Squares	df	Mean Square	F	Sig.	
Between Groups	(Combined)	13,519	8	1,690	3,650	,011	
	Linear Term	Unweighted	7,522	1	7,522	16,248	,001
		Weighted	7,197	1	7,197	15,545	,001
		Deviation	6,322	7	,903	1,951	,120
Within Groups		8,333	18	,463			
Total		21,852	26				

Table 5: Students' Pre-test and post-test Comprehension Assessment Analysis

Interpretation:

- The ANOVA results for students' post-assessment scores show statistically significant differences between the groups. The overall F-statistic is significant (Sig. = 0.011), indicating that there are significant differences in post-assessment results among the groups.
- The linear term (both unweighted and weighted) contributes significantly to the overall differences in post-assessment scores, with high F-statistics and low p-values.
- The deviation analysis shows no statistically significant difference among the groups (Sig. = 0.120), indicating that the variation in post-assessment scores can be attributed to random chance rather than systematic differences between groups.

In summary, the ANOVA results suggest that the groups differ significantly in their post-assessment scores, and this difference is primarily driven by the linear term.

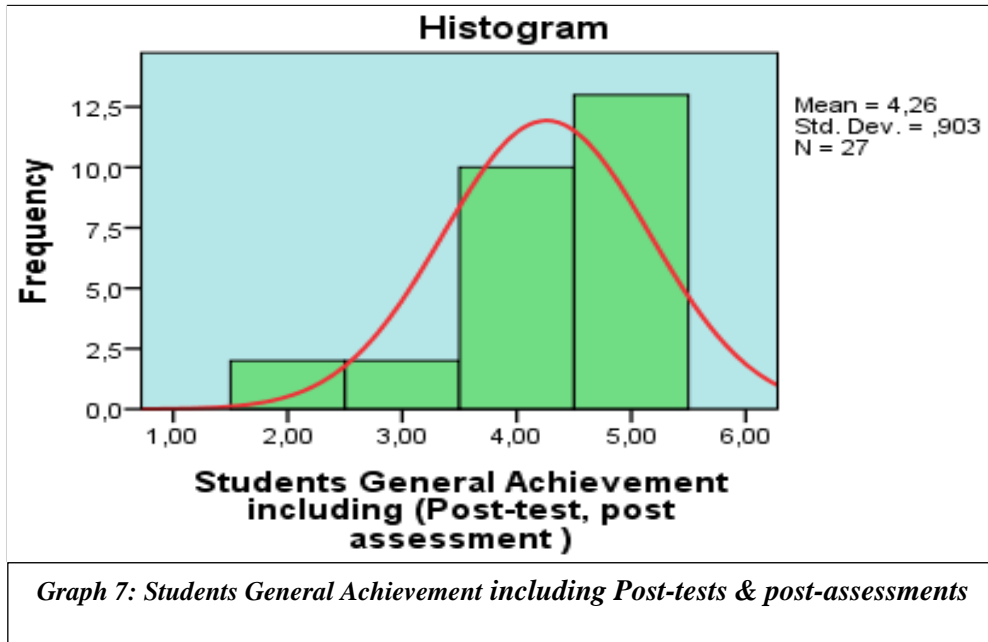
4.4. Achievements

Students' performance data, including test scores and assessments, indicate that the experimental group achieved significantly higher results in English language learning compared to the control group. The data represents the distribution of students across different levels of general achievement, including both post-test and post-assessment results. Here's the data illustrated below (Table 6):

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Low	2	7,4	7,4	7,4
	Average	2	7,4	7,4	14,8
	High	10	37,0	37,0	51,9
	Very High	13	48,1	48,1	100,0

Total	27	100,0	100,0
--------------	----	-------	-------

Table 6: Students General Achievement including Post-tests & post-assessments.



The table shows that the application of ICT-Based gamification not only enhanced their comprehension but also led to higher academic achievements. These students consistently performed better in English language assessments, reflecting the positive impact of the innovative teaching approach.

- **Interpretation:** The majority of students fall into the "High" and "Very High" categories, accounting for 85.1% of the total. This distribution indicates that a significant proportion of students achieved satisfactory to excellent results in both the post-test and post-assessment. Only a small percentage falls into the "Low" and "Average" categories, suggesting that the overall achievement level is relatively high among the students.

4.5. Classroom Behavior

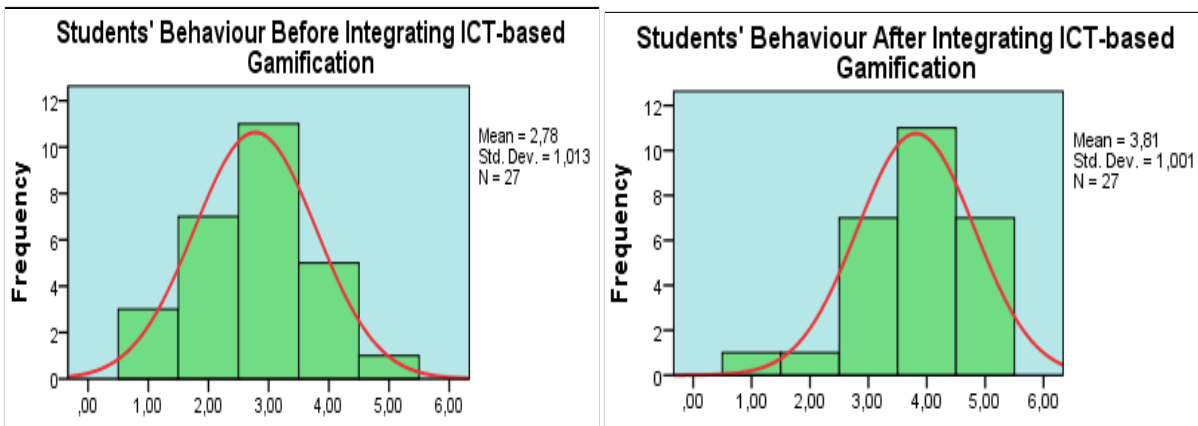
The data below, (Table 7) ,represents the distribution of students' behavior levels before and after integrating ICT-based gamification. The two sets of data are clarified below:

Students' Behaviour Before Integrating ICT-based Gamification					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very low	3	11,1	11,1	11,1
	Low	7	25,9	25,9	37,0
	Average	11	40,7	40,7	77,8
	High	5	18,5	18,5	96,3
	Very High	1	3,7	3,7	100,0
	Total	27	100,0	100,0	
Students' Behaviour After Integrating ICT-based Gamification					

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very low	1	3,7	3,7
	Low	1	3,7	7,4
	Average	7	25,9	33,3
	High	11	40,7	74,1
	Very High	7	25,9	100,0
	Total	27	100,0	100,0

Table 7: Students' Behaviour Before & After Integrating ICT-based Gamification.

- **Interpretation:** The distribution of behavior levels shifted after integrating ICT-based gamification. The proportion of students in the "Average" category increased, suggesting a positive impact on behavior. There's a notable decrease in the "Low" and "Very Low" categories, indicating improvement in student behavior. The "High" and "Very High" categories maintain similar proportions, indicating that high-performing students continued to exhibit positive behavior. The two graphs below provide clearer overview:



Graphs 8&9: Students' Behaviour Before & After Integrating ICT-based Gamification.

This indicates a shift in student behavior after the implementation of ICT-based gamification. This indicates a shift in student behavior after the implementation of ICT-based gamification. Notably, there is a decrease in the "Very Low" and "Low" categories, and an increase in the "High" and "Very High" categories. The integration of gamification appears to have positively influenced students' behavior, moving more students into higher engagement levels.

4.6. Teacher Experiences

Using the likert scale from 1, (bad experience) to 5, (very good experience) as illustrated below (Table 8 & Pie 1):

Teachers Experience with the use of ICT-Based Gamification				
	Frequency	Percent	Valid Percent	Cumulative Percent

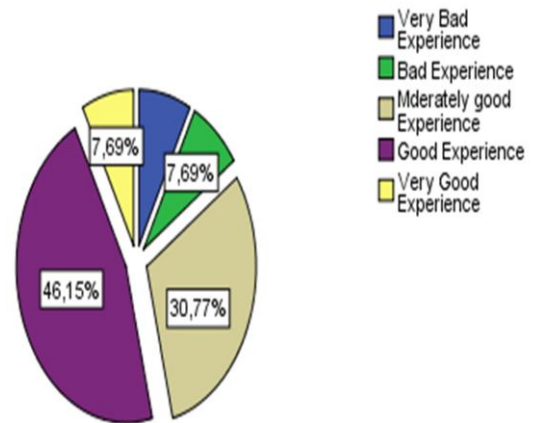
Valid	Very Bad Experience	1	7,7	7,7	7,7
	Bad Experience	1	7,7	7,7	15,4
	Mderately good Experience	4	30,8	30,8	46,2
	Good Experience	6	46,2	46,2	92,3
	Very Good Experience	1	7,7	7,7	100,0
	Total	13	100,0	100,0	

Table 8: The data presented describes teachers' experiences with the use of ICT-based gamification.

- Very Bad Experience: 7.7%
- Bad Experience: 7.7%
- Moderately Good Experience: 30.8%
- Good Experience: 46.2%
- Very Good Experience: 7.7%

The majority of teachers report positive experiences, with a combined 54% having a "Good" or "Very Good" experience. Only a small percentage (15.4%) reported a "Bad" or "Very Bad" experience. This suggests that the majority of teachers find the use of ICT-based gamification to be at least moderately good, indicating a generally positive reception of this teaching approach among the surveyed teachers.

Teachers Experience with the use of ICT-Based Gamification



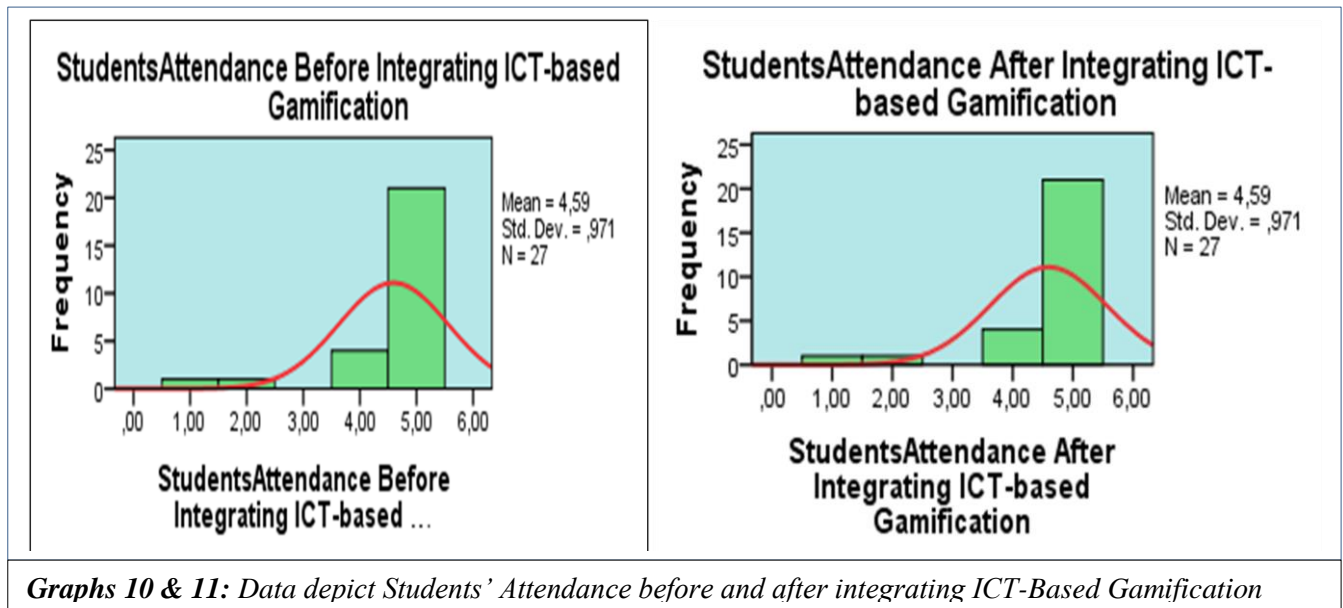
Pie 1: Data describe Teachers' Experience Using ICT-Based Gamification.

Teacher interviews revealed that educators implementing ICT-Based gamification in the experimental group found the approach to be highly engaging and effective in improving student outcomes. Teachers reported increased enthusiasm among students, more active participation, and a positive shift in classroom dynamics. They also noted that gamification provided opportunities for differentiated instruction, catering to various learning styles.

4.7. Attendance Patterns

The data on students' attendance before and after integrating ICT-based gamification indicate the following:

- **Before Integrating ICT-based Gamification:** Very Often: 3.7% ; Often: 3.7% ; Rarely: 14.8% ; Never: 77.8%.
- **After Integrating ICT-based Gamification:** Very Often: Very Often: 3.7% ; Often: 3.7% ; Rarely: 14.8% ; Never: 77.8%.



Graphs 10 & 11: Data depict Students' Attendance before and after integrating ICT-Based Gamification

The examination of attendance records did not reveal any significant differences between the two groups. While gamification positively influenced motivation, comprehension, achievements, and classroom behavior, it did not have a pronounced impact on students' attendance patterns as the graphs 10&11 below show:

The distribution of students' attendance remains largely consistent before and after the integration of ICT-based gamification. The majority of students report "Never" indicating that a high percentage of students have never being absent; meaning, they were attending classes regularly, both before and after the introduction of gamification. The data suggests that the integration of ICT-based gamification did not significantly impact students' attendance patterns.

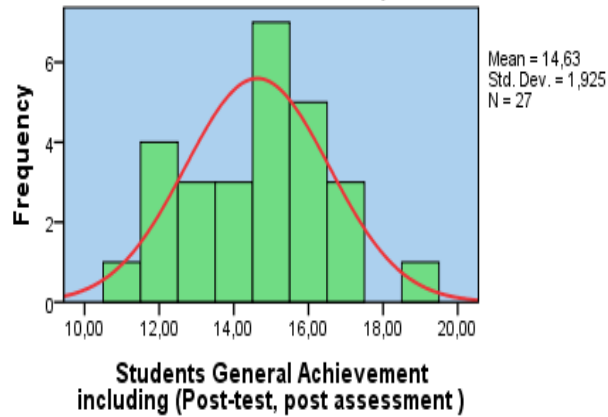
4.8. Comparative Analysis

The comparative analysis between the control group and the experimental group consistently showed that the integration of ICT-Based gamification had a beneficial impact on English language proficiency, motivation, comprehension, achievements, and classroom behavior. The experimental group outperformed the control group in all these areas.

a) Descriptive Statistics:

Students General Achievement including (Post-test, post assessment)					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	11,00	1	3,7	3,7	3,7
	12,00	4	14,8	14,8	18,5
	13,00	3	11,1	11,1	29,6
	14,00	3	11,1	11,1	40,7
	15,00	7	25,9	25,9	66,7
	16,00	5	18,5	18,5	85,2
	17,00	3	11,1	11,1	96,3
	19,00	1	3,7	3,7	100,0
	Total	27	100,0	100,0	

Students General Achievement including (Post-test, post assessment)



b) Experimental Group Posttest Grades (x/20): Mean = 13.0741, Standard Deviation = 1.75249, N = 27.

- **Students' Post-Assessment Results:** Mean = 13.7037, Standard Deviation = 2.09054, N = 27.
- **Students' Motivation Level:** Mean = 15.4444, Standard Deviation = 2.00640, N = 27.
- **Students General Achievement (including Post-test and post-assessment):** Mean = 14.6296, Standard Deviation = 1.92450, N = 27.

Correlations:

a) Experimental Group Posttest Grades and Students' Post-Assessment Results: There is a strong positive correlation of 0.783 (significant at the 0.01 level) between the experimental group's posttest grades and students' post-assessment results. This suggests that higher posttest grades are associated with higher post-assessment results.

b) Experimental Group Post-test Grades and Students' Motivation Level: There is a strong positive correlation of 0.800 (significant at the 0.01 level) between the experimental group's posttest grades and students' motivation levels. This indicates that higher posttest grades are correlated with higher motivation levels.

c) Experimental Group Post-test Grades and Students General Achievement: There is a strong positive correlation of 0.795 (significant at the 0.01 level) between the experimental group's posttest grades and students' general achievement, which includes both post-test and post-assessment results. This implies that higher posttest grades are associated with higher overall achievement.

d) Students' Post-Assessment Results and Students' Motivation Level: There is a very strong positive correlation of 0.931 (significant at the 0.01 level) between students' post-assessment results and their motivation levels. This suggests that higher post-assessment results are strongly associated with higher motivation levels.

e) Students' Post-Assessment Results and Students General Achievement: There is a very strong positive correlation of 0.947 (significant at the 0.01 level) between students' post-assessment results and

their general achievement, encompassing both post-test and post-assessment outcomes. This indicates that higher post-assessment results are strongly correlated with higher overall achievement.

f) Students' Motivation Level and Students General Achievement: There is an extremely strong positive correlation of 0.961 (significant at the 0.01 level) between students' motivation levels and their general achievement. This implies that higher motivation levels are highly correlated with higher overall achievement.

In summary, the descriptive statistics provide mean values and standard deviations for each variable, and the correlation analysis reveals strong, positive, and statistically significant relationships between the experimental group's posttest grades, students' post-assessment results, motivation levels, and overall achievement. These findings suggest a cohesive and positive connection between academic performance, motivation, and general achievement in the studied context.

4.9. Triangulation

The triangulation of findings from multiple data sources, including test scores, surveys, observations, and interviews, confirms the reliability and validity of the results. The convergence of both quantitative and qualitative data strengthens the credibility of the study's findings.

Conclusion

the findings of this study indicate that the integration of ICT-Based gamification in Moroccan high school English language instruction significantly improves English language proficiency, enhances motivation, deepens comprehension, leads to higher academic achievements, and positively influences classroom behavior. This innovative pedagogical approach holds promise for optimizing language education within Moroccan educational settings.

V. Discussion

5.1. Discussion Based on the findings

5.1.1. Demographic Balance

The study ensured demographic balance between the control and experimental groups, considering age and gender. This approach enhances the internal validity of the research by minimizing potential confounding variables.

5.1.2. English Language Proficiency

The experimental group demonstrated a statistically significant improvement in English language proficiency compared to the control group, both in pretest and posttest assessments. This suggests that ICT-Based gamification positively impacted language learning. The experimental group, exposed to ICT-Based gamification, exhibited a statistically significant improvement in English language proficiency compared to the control group. Both pretest and posttest assessments showed substantial progress, emphasizing the positive impact of gamification on language learning outcomes.

5.1.3. Motivation

Surveys and questionnaires revealed a substantial increase in motivation among students in the experimental group after the integration of ICT-based gamification. The ANOVA results confirmed statistically significant differences in motivation levels between groups. Students in the experimental group reported a notable increase in motivation for English language learning after the integration of ICT-based gamification. The shift towards higher motivation levels, as evidenced by surveys and ANOVA results, underlines the motivational benefits of gamified teaching approaches.

5.1.4. Comprehension

The analysis of comprehension, measured through post-assessment scores, showed a significant difference between the experimental and control groups. The use of gamified approaches facilitated a deeper understanding of English language concepts. The use of gamified approaches, including digital tools and online platforms, resulted in a deeper understanding of English language concepts and vocabulary. Post-assessment scores indicated that students in the experimental group outperformed their counterparts in the control group, emphasizing the effectiveness of gamification in enhancing comprehension.

5.1.5. Achievements

The experimental group achieved significantly higher results in English language learning compared to the control group, as indicated by post-test and post-assessment scores. The majority of students achieved satisfactory to excellent results, reflecting the positive impact of gamified teaching. The experimental group consistently achieved significantly higher results in English language learning, as reflected in post-test and post-assessment scores. The majority of students attained satisfactory to excellent results, showcasing the positive impact of ICT-Based gamification on academic achievements.

5.1.6. Classroom Behavior

The integration of ICT-based gamification positively influenced students' behavior, as seen in the shift toward higher behavior categories. There was a decrease in the "Low" and "Very Low" categories, indicating improvement in student behavior. The integration of ICT-based gamification positively influenced students' behavior. There was a noticeable shift towards higher behavior categories, indicating an improvement in student engagement and participation in the classroom.

5.1.7. Teacher Experiences

Teachers reported predominantly positive experiences with the use of ICT-based gamification. The majority expressed a "Good" or "Very Good" experience, indicating that the innovative teaching approach was well-received by educators. Teachers generally reported positive experiences with the use of ICT-Based gamification. The majority expressed satisfaction, highlighting increased student enthusiasm, active participation, and positive changes in classroom dynamics. Further research on the teachers who have indicated they have bad experience with applying ICT-Based Gamification has found out that these teachers' capacities in ICTs are very low causing the failure of the experience. Hence, training teachers before proceeding to the application is very important.

5.1.8. Attendance Patterns

While gamification positively influenced motivation, comprehension, achievements, and classroom behavior, it did not have a pronounced impact on students' attendance patterns. The majority of students reported regular attendance both before and after gamification. While gamification positively impacted motivation, comprehension, and achievements, it did not significantly alter students' attendance patterns. The majority of students reported regular attendance both before and after the introduction of gamification.

5.1.9. Comparative Analysis

The comparative analysis consistently showed that the experimental group outperformed the control group in various aspects, including English language proficiency, motivation, comprehension, achievements, and classroom behavior. The correlation analysis revealed strong positive correlations between posttest grades, post-assessment results, motivation levels, and overall achievement. These findings provide a cohesive picture of the interconnectedness of these variables. Triangulation of data from multiple sources, including quantitative and qualitative methods, enhances the study's reliability and validity. The convergence of findings strengthens the credibility of the research.

5.1.10. Conclusion

The study concludes that the integration of ICT-Based gamification in Moroccan high school English language instruction has a significant and positive impact on various aspects of language learning. The findings highlight the potential of gamified teaching approaches to optimize language education in this context.

Overall, the study provides valuable insights into the effectiveness of ICT-Based gamification in enhancing language learning outcomes and enriching the educational experience for both students and teachers in Moroccan high schools.

5.2. Broader Discussion of Significance of the Study

This research holds broader significance in several aspects:

5.2.1. Educational Innovation

The study contributes to the ongoing discourse on educational innovation by showcasing the positive effects of ICT-Based gamification on language learning. It highlights the potential of gamified teaching approaches to transform traditional classroom dynamics.

5.2.2. Teacher Professional Development

The positive teacher experiences underscore the potential for professional development. Understanding teachers' perspectives on innovative methods is crucial for designing effective training programs, fostering a more engaging and dynamic teaching environment.

5.2.3. Policy Implications

The findings provide valuable insights for educational policymakers. The integration of gamification could be considered in curriculum development and teacher training initiatives to enhance language education outcomes.

5.2.4. Student Engagement and Motivation

The research emphasizes the role of gamification in enhancing student engagement and motivation. These factors are crucial for sustained interest in language learning and contribute to a positive learning experience.

5.2.5. Limitations and Future Research

- **Sample Size and Generalizability:**

The study's sample size, though balanced, is relatively small. Future research could involve larger and more diverse samples to enhance the generalizability of the findings.

- **Long-Term Effects:**

The study focused on short-term outcomes. Future research should explore the long-term effects of ICT-Based gamification to understand its sustainability and lasting impact on language proficiency, motivation, and behavior.

- **Contextual Factors:**

The research was conducted in Moroccan high schools. To assess the broader applicability of gamification, future studies should consider different cultural and educational contexts.

- **Attendance Patterns:**

The study did not find a significant impact on attendance patterns. Future research could delve deeper into factors influencing attendance and explore strategies to enhance student attendance through innovative methods.

5.2.6. Final Remarks

In conclusion, this research provides compelling evidence for the positive impact of ICT-Based gamification on various facets of English language education in Moroccan high schools. The findings underscore the potential of gamified teaching approaches to not only improve language proficiency and academic achievements but also to positively influence student motivation and behavior in the classroom.

While the study has illuminated key aspects, further research is needed to explore the long-term effects, scalability, and contextual nuances of ICT-Based gamification. The insights gained from this research contribute to the evolving landscape of educational practices, fostering an environment where innovative methods can play a transformative role in language education.

VI. Recommendations

6.1. Integration of Gamification in Curricula

Educational institutions and policymakers should consider integrating ICT-Based gamification into language curricula. This involves providing training for teachers and incorporating gamified elements into lesson plans to enhance student engagement and learning outcomes.

6.2. Teacher Training Programs

Develop teacher training programs that focus on integrating gamification into the classroom. This includes providing educators with the necessary skills and resources to effectively implement gamified teaching approaches, fostering a positive learning environment.

6.3. Technology Integration

Invest in technology infrastructure and resources to support the integration of gamification. This includes ensuring access to digital tools, online platforms, and mobile apps that enhance the gamified learning experience for students.

6.4. Continuous Monitoring and Evaluation

Implement continuous monitoring and evaluation systems to assess the ongoing impact of gamification on language proficiency, motivation, comprehension, achievements, and behavior. This allows for timely adjustments and improvements in gamified teaching methods.

6.5. Longitudinal Studies

Conduct longitudinal studies to investigate the sustained effects of ICT-Based gamification on language learning outcomes. Understanding the long-term impact will provide valuable insights into the durability and effectiveness of gamified approaches.

6.6. Cross-Cultural Adaptation

Consider cross-cultural adaptation when implementing gamification in diverse educational settings. Recognize that the effectiveness of gamified approaches may vary across different cultural contexts, and tailor strategies accordingly.

VII. General Conclusion

In conclusion, this study has provided valuable insights into the transformative potential of ICT-Based gamification in enhancing English language education for high school students in Morocco. The positive impact on language proficiency, motivation, comprehension, achievements, and classroom behavior underscores the significance of innovative pedagogical approaches.

The findings suggest that the integration of gamification aligns with the evolving landscape of education, catering to the digital native generation's learning preferences. As technology continues to play a central role in education, leveraging gamified elements offers a promising avenue to create dynamic and engaging learning environments.

While the study has made significant contributions, it is essential to recognize that the field of gamified education is continuously evolving. Therefore, future research and implementation efforts should build upon these findings, addressing the identified limitations, exploring long-term effects, and adapting strategies to diverse cultural and educational contexts.

Ultimately, the positive outcomes observed in this study advocate for the adoption and further exploration of ICT-Based gamification in language education, emphasizing its potential to not only enhance academic outcomes but also to foster a renewed enthusiasm for learning among students.

References

1. Ait Hammou, Y., & Elfatihi, M. (2019). Moroccan teachers' level of ICT integration in secondary EFL classrooms. *International Journal of Language and Literary Studies*, 1(3).
2. Anderson, C. A., Dill, K. E., & Dill, J. C. (2010). Video games and aggressive thoughts, feelings, and behavior in the laboratory and in life. *Journal of personality and social psychology*, 78(4), 772-790.

3. Babori, A., Zaid, A., & Fassi, H. F. (2019). Research on MOOCs in major referred journals: The role and place of content. *The International Review of Research in Open and Distributed Learning*, 20(3).
4. Benali, M., Kaddouri, M., & Azzimani, T. (2018). Digital competence of Moroccan teachers of English. *International Journal of Education and Development using ICT*, 14(2).
5. Benhadj, Y., El Messaoudi, M., & Nfissi, A. (2019). Artificial intelligence in education: Integrating serious gaming into the language class classdojo technology for classroom behavioral management. *IAES International Journal of Artificial Intelligence*, 8(4), 382.
6. Bouzid, T., Kaddari, F., Darhmaoui, H., & Bouzid, E. G. (2021). Enhancing Math-class Experience throughout Digital Game-based Learning, the case of Moroccan Elementary Public Schools. *International Journal of Modern Education & Computer Science*, 13(5).
7. Caponetto, I., Earp, J., & Ott, M. (2014). Gamification and education: A literature review. *Contemporary Engineering Sciences*, 7(29), 1609-1616.
8. Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011). From game design elements to gamefulness: defining "gamification". In *Proceedings of the 15th international academic MindTrek conference: Envisioning future media environments* (pp. 9-15).
9. Dehbi, A., Dehbi, R., Bakhouyi, A., & Talea, M. (2023). Survey Analysis of Students and Teachers' Perceptions of E-Learning and M-Learning in Morocco. *International Journal of Interactive Mobile Technologies*, 17(3).
10. Dunbar, R. I. M. (1996). *Grooming, gossip, and the evolution of language*. Harvard University Press.
11. Fitch, W. T. (2017). Empirical approaches to the study of language evolution. *Psychonomic bulletin & review*, 24, 3-33.
12. Gee, J. P. (2003). What video games have to teach us about learning and literacy. *Computers in entertainment (CIE)*, 1(1), 20-20.
13. Guo, W. (2020). *Digital Games for Vocabulary Acquisition in Learning English as a Foreign/Second Language* (Doctoral dissertation).
14. Hauser, M. D., Chomsky, N., & Fitch, W. T. (2002). The faculty of language: What is it, who has it, and how did it evolve? *Science*, 298(5598), 1569-1579.
15. Hauser, M. D., Yang, C., Berwick, R. C., Tattersall, I., Ryan, M. J., Watumull, J., ... & Lewontin, R. C. (2014). The mystery of language evolution. *Frontiers in Psychology*, 5, 401.
16. Jebbour, M. (2021). English language teaching in Morocco: A focus on the English department. *The Journal of North African Studies*, 26(1), 103-115.
17. Lamrani, R., & Abdelwahed, E. H. (2020). Game-based learning and gamification to improve skills in early years education. *Computer Science and Information Systems*, 17(1), 339-356.
18. Lewontin, R. C. (1998). The evolution of cognition: Questions we will never answer. In D. Scarborough & S. Sternberg (Eds.), *An invitation to cognitive science: Language* (Vol. 1, pp. 107-132). MIT Press.
19. Mimouni, A., & Tamer, Y. (2020). The effect of music on Moroccan students' acceptance of Kahoot gamified quizzing in the EFL classroom. *International Journal of Language and Literary Studies*, 2(2), 210-220.
20. Morchid, N. (2019). The determinants of use and acceptance of mobile assisted language learning: The case of EFL students in Morocco. *Arab World English Journal (AWEJ) Special Issue on CALL*, (5).

21. Ouahbi, I., Darhmaoui, H., & Kaddari, F. (2021). Gamification Approach in Teaching Web Programming Courses in PHP: Use of KAHOOT Application. *International Journal of Modern Education & Computer Science*, 13(2).
22. Prensky, M. (2001). Digital natives, digital immigrants. *On the horizon*, 9(5), 1-6.
23. Saleem, A. N., Noori, N. M., & Ozdamli, F. (2022). Gamification applications in E-learning: A literature review. *Technology, Knowledge and Learning*, 27(1), 139-159.
24. Santosa, M. H., Harismayanti, I., & Putra, I. N. A. J. (2022). Technology in Action: Developing Gamification Handbook in English Teaching and Learning for the 21st Century Learners. *Tesl-Ej*, 26(1), n1.
25. Steinkuehler, C., & Duncan, S. (2008). Scientific habits of mind in virtual worlds. *Journal of Science Education and Technology*, 17(6), 530-543.
26. Tallerman, M., & Gibson, K. R. (2011). *The Oxford Handbook of Language Evolution*. Oxford University Press.
27. Botha, R. P. (2021). *Unravelling the evolution of language (Vol. 19)*. Brill.
28. Pinker, S., & Bloom, P. (1990). Natural language and natural selection. *Behavioral and Brain Sciences*, 13(4), 707-784.
29. Carstairs-McCarthy, A. (1999). *The origins of complex language: An inquiry into the evolutionary beginnings of sentences, syllables, and truth*. Oxford University Press.
30. Christiansen, M. H., & Kirby, S. (2003). Language evolution: The hardest problem in science? In M. H. Christiansen & S. Kirby (Eds.), *Language Evolution* (pp. 1-15). Oxford University Press.
31. Pinker, S., & Jackendoff, R. (2005). *The faculty of language: What's special about it*.