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Online Games and AI ChatGPT: 7th Grade English as a Foreign Language Learners' Vocabulary Acquisition and Preferences in the UAE

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Abstract: Extensive research has been conducted on the intersection of digital games and AI, exploring how it impacts the diverse variables of education, such as proficiency, vocabulary, and motivation. However, there is a lack of studies that have comprehensively assessed the combined impact of digital games and AI applications on enhancing six aspects of vocabulary. This study focused on finding the possible effect of using the combination of digital games and the Artificial Intelligence Chat GPT application technique (AIGames) on developing the 7th-grade EFL learners' vocabulary acquisition and their attitude toward such a technique. Based on an experimental and descriptive design, a quantitative approach was used. The participants were assigned to two groups randomly: the experimental group, which studied using this technique, and the control group, which was taught using the regular instruction method. The study used two instruments: a pre-posttest and an attitude scale (questionnaire). The findings revealed statistically significant differences between the experimental and control groups in vocabulary learning due to using the AIGames technique in favor of the experimental group. The post-test results (Table 2) revealed significant improvements across all six vocabulary aspects, with the largest gains in *denotation* (experimental group: M=7.82 vs. control: M=4.56) and *spelling* (M=7.59 vs. 5.38). Pronunciation showed the slightest improvement (M=5.41 vs. 3.69), suggesting that the AIGames technique was less effective for this aspect. The study also showed that most participants in the experimental group had a positive attitude towards using the new technique in learning vocabulary. Moreover, the study revealed no correlation between the experimental students' achievement in vocabulary and their perception of using the AIGames technique.

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Introduction

Information Technology (IT) has grown very fast alongside the COVID-19 pandemic; therefore, it is time for an educational revolution that abandons traditional teaching methods and shifts toward adopting modern language teaching/learning methods. Research has shown the importance of implementing games into the teaching and learning experience (Bi & Song, 2011). Previous studies have also supported the efficacy of games in language learning and its impact on learners' motivation (Al-Sharafat & AbuSeileek, 2012; Ashraf et al., 2014; Carrillo et al., 2019; Ebrahimzadeh & Alavi, 2017; Derakhshan et al., 2024; Smirani & Yamani, 2024; Teng, 2022; Teo et al., 2022). These studies highlight that games positively impact students' motivation and enhance their engagement during the learning process. The implementation of gamification techniques can foster creativity and active language construction among students as their motivation to utilize new vocabulary increases. Other studies have shown that digital games utilized for language learning can effectively enhance all four essential language skills while also contributing to expanding vocabulary and improving grammatical competence (Vnucko & Klimova, 2023; Pitarch, 2018; Wichadee & Pattanapichet, 2018).

Vocabulary is an important language component, enabling users to communicate in real life. In support of this view, Harmer (2001) confirmed that vocabulary acquisition plays a crucial role in learning a second language. It serves as the cornerstone upon which learners construct their understanding. According to Harmer (2001), vocabulary can be likened to the vital organs and flesh of a language, while language structures form its skeleton (p. 246), emphasizing the importance of teaching vocabulary in second language learning. Lessard-Clouston (2013) argued that the importance of vocabulary in English language teaching cannot be overstated, as it is essential for both understanding others and expressing one's own ideas.

Based on the results of previous research, Mohamed (2017) proposed that teachers use language games, which focus on learners' vocabulary enhancement. For Lessard-Clouston (2013), vocabulary is vital in teaching English because understanding and communication from the other side are essential for a person to think and articulate. With this evidence, Mohamed (2017) offered particular games aimed at EFL teachers to aid in learners' vocabulary growth and development. According to Vnucko and Klimova (2023), using digital games in vocabulary learning not only makes the students more interested but also gets them actively involved in the vocabulary learning process. Furthermore, Tobias et al.

(2014) highlighted that game-based learning (GBL) design features that support sound educational principles greatly enhance learning outcomes, reiterating that learners can better acquire and consolidate new vocabulary through digital games instead of face-to-face instruction. Similarly, Chang and Hwang (2019) indicated that increasing mobile technologies have enabled more personalized and responsive learning, leading to GBL, which is effective for vocabulary development. Hussein et al. (2022) provided compelling evidence for using GBL for conceptual understanding and motivation and encouraged research on the implications of game mechanics on vocabulary retention. In the same vein, Guan et al. (2024) revealed that GBL increases levels of engagement and retention, even in young learners. They proposed that GBL might aid in long-term learning outcomes if students are introduced to digital games as a vehicle to learn new vocabulary at an early age.

Apart from general game-based language learning, some studies have examined the particularities of video game-assisted vocabulary learning in particular contexts, such as medical and academic English. Derakhshan et al. (2024) investigated the use of mobile virtual reality (VR) in teaching medical English and reported that simulated three-dimensional settings were very beneficial in teaching English for Medical and Academic Purposes (EMAP). However, the study pointed out that VR applications in English vocabulary instruction were less effective at representing abstract language elements, which implies that game-based learning might be more effective in narrowly defined, structured language learning environments. Similarly, Teo et al. (2022) investigated AR game-assisted flipped classrooms for English for Medical Purposes and found that students' participation and understanding improved significantly in the presence of teacher immediacy. In addition, the study observed that AR multiplayer simulations promoted interaction among students, thus creating a more integrated environment for learning a specific field of language. These results confirm the broader research conducted by Sun et al. (2024), who claimed that features like adaptive feedback and challenge-based systems within AI-enhanced games help engagement and personalization of learning.

Moreover, Behnamnia et al. (2023) also endorsed digital game activities for preschool children and proved their ability to develop basic vocabulary. Besides, Chen et al. (2022) analyzed three decades of literature on GBL in science and mathematics. They reported its favorable effects on students' participation and their problem-solving ability, which are important in vocabulary learning. Yang et al. (2024) studied game-based language learning at the K-12 level. They concluded that digital games aid vocabulary learning and comprehension. Lastly, Dahalan et al. (2024) discovered that gamification in vocational

education increases learner engagement and skillful performance. These findings imply that similarly structured gamified techniques would also be helpful for teaching languages. Considering these considerations, the use of both conventional and modern games for vocabulary teaching not only increases the motivation and participation of EFL learners but also fosters their intellectual growth, long-term retention, and flexibility in various learning approaches. However, VR- and AR-assisted language teaching results indicate that game-based learning is more beneficial for specialized language grasping than general vocabulary acquisition, especially in areas where preservation of specialized words is essential.

Artificial intelligence (AI) has been effectively used in teaching and learning languages. It is used primarily to generate texts and correct language mistakes. One of the prominent applications used in the process of language teaching and learning is ChatGPT. According to Baskara (2023), ChatGPT can generate human-like text on various topics. Baskara adds that AI applications like ChatGPT can be integrated into language education programs. Similarly, Kostka and Toncelli (2023) point out that AI applications like ChatGPT can be used to generate unique human-like texts and interact with users effectively. ChatGPT can also help users check their work, correct errors, boost learners' language, and enhance teachers' roles in the language teaching/learning process.

The integration of digital games and AI applications (AIGames technique) could be a functional language learning technique for developing EFL learners' English language learning of different skills and areas, like vocabulary. On the one hand, digital games can be used to learn a language effectively in a relaxed, exciting atmosphere. On the other hand, using AI applications such as ChatGPT and similar AI applications can make the process of English language teaching more functional. In this study, we considered using AIGames to enhance the EFL learners' vocabulary learning experience. To our knowledge, this may be a new technique that has never been used in previous research.

Vocabulary is taught mainly by drilling, either through repetition, using them in sentences, or giving their definition. We visited some private schools and made class observations that have driven us to the conclusion that probably no English language teacher ever used games or AI applications in their vocabulary teachings, even though research has proven that using games (e.g., Mohamed, 2017) and AI (Nazari et al., 2021) helps to build better vocabulary. Moreover, we have found that there has not yet been any research on how using digital games and AI affects vocabulary among students learning English as a foreign language in the UAE. This has inspired us to investigate the effect of using digital games and an AI application combined (AIGames technique) to enhance the 7th-grade EFL students'

vocabulary acquisition at one of the private schools in the UAE. Therefore, the insights from this study could offer some guidance to teachers interested in blending digital games and AI tools into their teaching methods. Moreover, these insights could enrich the knowledge on how digital educational games and AI applications influence vocabulary learning.

Building on the insights and recommendations from Saleh and Althaqafi (2022), as well as Ajlouni et al. (2023), and considering the lack of deployment of digital language games and AI applications in UAE schools, our current study seeks to explore how the innovative AIGames technique affects vocabulary development among EFL learners in private schools in the UAE. Additionally, we aim to understand the learners' perspectives on integrating this technique into their vocabulary learning. More specifically, the present research aims to answer the following three research questions:

1) What is the impact of using the AIGames technique on the 7th-grade EFL learners' vocabulary acquisition in UAE private schools?

2) What are the attitudes of the 7th-grade EFL learners in the UAE private schools toward using the AIGames technique on language instruction?

3) Is there any correlation between the 7th-grade EFL learners' achievement in vocabulary and their attitude toward using this combined technique to learn it in the UAE private schools?

Literature Review

The Role of Vocabulary Teaching and Educational Games in EFL

Teaching vocabulary in the EFL context is of incredible significance because it forms the basis upon which the development of other language skills—reading, speaking, and writing—bases itself and thus critically impacts foreign language classrooms (Nam, 2010). Nonetheless, Rohani and Pourgharib (2013) highlight the limitations of traditional vocabulary teaching methods, stating that students often struggle to connect learned vocabulary with their own experiences and interests due to a lack of context.

Although some educators hesitate to incorporate games into the curriculum, perceiving them as distractions that undermine educational goals (Stojković & Jerotijević, 2011), many teachers actively use educational games, particularly in vocabulary teaching within the EFL curriculum. Studies, such as those by Huyen and Nga (2003) and Mohamed and Shaaban (2021) argue that games enhance language retention and create a relaxed and motivational learning atmosphere. In the same vein, Abd El-Aleem (2014) asserts that games increase motivation by altering a lesson's pace, while Ahmed et al. (2022) suggest that game-based

learning (GBL) reduces language apprehension and fosters enthusiasm, particularly among Iranian EFL learners.

Recent studies mostly emphasize digital educational games. To illustrate, Ciaramella (2017) studied the use of Kahoot in vocabulary lectures and endorsed its application, arguing that it facilitates retention, vocabulary, and reading comprehension over time. Similarly, Tsai and Tsai (2018) appreciated the value of digital games for L2 vocabulary teaching, albeit with the reservation that the effectiveness of digital games is contingent upon multiple factors, including game features and teaching environment. Mohamed (2021) conducted a comparative study involving students learning vocabulary through educational games and those using conventional methods, showing game-based learning in a positive light. In the same way, Hofmeyr (2024) described students' attitudes towards digital game-based language learning (DGBLL) as very positive both during and after a cooperative digital game intervention.

Some practical studies have documented the positive impact of games and their advantages. According to Wright et al. (1984), incorporating games enables teachers to establish diverse contexts in which students are prompted to utilize the language for communication, information exchange, and expressing their opinions. Al-Sharafat and AbuSeileek (2012) found that website-based game instruction revealed a more statistically significant improvement in English vocabulary on the post-test than regular instruction. Abd El-Aleem (2014) discussed how games can increase student motivation by introducing variations in the pace of lessons. Similarly, Ashraf et al. (2014) concluded that games promote fluency, enjoyment, and relaxation, leading to a favorable atmosphere in English classes. Games alter the classroom environment, motivating students and creating a stimulating context (Iaremenko, 2017). Mohamed and Shaaban (2021) further support the use of educational games in vocabulary instruction, indicating the value that comes from the relaxed and motivating environments that such games create.

Challenges and Considerations in Implementing Game-Based Learning

Though most of the studies reviewed so far support the use of educational games in English language learning, there remain possibilities of some negative aspects in the existing literature regarding educational games. Educators have expressed apprehension about incorporating games into the classroom, fearing that such an approach might lead to disorganization and time wastage without fulfilling any learning goals (Saleh & Althaqafi, 2022). Mohamed and Shaaban (2021) echoed these concerns, noting their relevance in the

Arab World. While educational institutions increasingly integrate games into their curricula, this adoption often lacks methodological development. Mohamed and Shaaban (2021) mentioned that implementing game-based learning should be preceded by reviewing the conditions of the educational environment, like "organizational support structures, availability of hardware and software, and the availability of other resources or even the obstacles that may face the learning process" (p. 165). Bi and Song (2011) suggested that the best way to optimize GBL is to understand its positive role properly, set an achievable goal, design the content, and give proper and timely feedback. Only then GBL can be productive and aligned with the learning goals and objectives.

Video games impact social behavior and motivation among students. In the Saudi context, Al Saud (2017) examined the extent to which educational video games affected the social skills of underprivileged youths in Riyadh. The researchers split the volunteers into two groups: an experimental group, in which they displayed ten educational video games on iPads, and a control group, members of which were not allowed to play any of the games. After the intervention, which lasted for three months, the study revealed that the children in the experimental group had improved their social behavior. In another study, Al-Jifri and Elyas (2017) examined how video gaming contributed to motivation and skills in language learning for a group of young male students in Jeddah. The findings revealed that video games were most effective in learning and enhanced EFL learners' motivation. Above all, the games also contributed to reading and, most significantly, speaking skills.

The Role of AI in English Language Learning and the Need for Further Research

Research has shown that AI is very effective in English language learning. For example, Kim (2019) showed that AI significantly improved students' English language. Similarly, Liu et al. (2023) found that automated writing AI techniques significantly enhanced students' English writing performance in the experimental group. In the same vein, Nazari et al. (2021) showed that students in the AI intervention condition group significantly improved in providing formative, effective feedback in English writing. Sumakul et al. (2021) supported this finding and reported that students had positive preferences for AI applications used in their writing classes.

Moreover, Labidi (2022) indicated that both students and instructors agreed that integrating AI might enhance understanding of the idea being learned. Likewise, Fitria's (2023) study revealed that students think AI applications help them develop their writing. Abdalkader (2022) agreed with this finding and found that participants' mean scores on the

post-test demonstrated that using AI applications enhances the pupils' writing fluency. Finally, other researchers (e.g., AbdAlgane & Othman, 2023; Ajlouni et al., 2023; Alam et al., 2023; Tri Utami et al., 2023) revealed that the use of AI in academic writing learning supported students in writing, and the students became interested in using AI technology in their lessons.

In summary, the digital games and AI in most of the reviewed studies were conducted to determine their influence on other variables, such as proficiency, vocabulary development, and motivation. Nevertheless, none of the studies had measured the compound effect of digital games and AI applications on vocabulary acquisition. That is, games that focus on some vocabulary aspects, such as connotation, spelling, derivation, pronunciation, collocation, and denotation in games to improve students' vocabulary learning. The literature review has also shown that no previous research has examined the impact of AIGames on Emirati EFL learners, where English is used in many daily encounters. Moreover, previous research focused only on using one or more language game types to develop vocabulary. However, the current study is different as it focused on combining two techniques to see their impact on vocabulary learning: digital games and the AI Chat Smith application.

Methods

Research Design and Instruments

A pre- and post-test was administered for all participants before and after the eight-week treatment. Each test consisted of six subtests, including six vocabulary aspects: connotation, spelling, derivation, pronunciation, collocation, and denotation. Each test included six items. An attitude questionnaire was also developed to measure the experimental group's perceptions of using the AIGames technique (a combination of digital games and the AI Chat Smith application) in vocabulary learning. While digital games and AI applications have been studied individually in language education, the novelty of this study lies in the *combined use* of these tools as an integrated pedagogical technique (AIGames). As highlighted in the literature review (Section 2), prior research has not comprehensively assessed the compound impact of digital games and AI applications on the six vocabulary aspects under investigation. The synthesis of these two variables into a single instructional framework represents a novel approach, addressing gaps identified in existing studies.

The study took place during the first semester of the academic year 2023/2024 at a private school in the UAE, chosen for logistic reasons, including the availability of a computer laboratory and the cooperation of the school administration in conducting the

experiment. The same instructor taught both the experimental and control groups, covering vocabulary activities from the first three units of the UAE English language curriculum, *Bridge to Success (Book 7)*. However, the experimental group was taught the keywords in these units using the new technique, including digital games (*Wordwall* games) and the AI Chat Smith application. AI Chat Smith, developed by OpenAI, is an interactive application that offers users instant answers on various language-related issues. Its features include wordplay riddles, word associations, grammar checks, paraphrasing, idiom explorations, proverbs, translation, writing assistance, research, and more.

Wordwall is an online platform for teachers and educators to create interactive learning activities and games. It provides different templates, namely games, quizzes, matching activities, and crosswords for different subjects and learning levels. Many such games can be played on the web or printed out for classroom use. *Wordwall* is popular in education, particularly for language learning, such as math, science, and vocabulary exercises in EFL. Teachers can either create their games or use pre-made games shared by other educators in the community.

The present research study is quantitative, and the collected data have been analyzed statistically to find answers to the research questions. Means, standard deviations, and F-values have been calculated to seek any significant differences that prevail between the experimental and control groups in their performance on vocabulary post-test items. This first research question was analyzed quantitatively to determine the difference in the vocabulary acquisition of the new technique, which involves digital games and the AI Chat Smith application for teaching vocabulary. The second research question was addressed by assessing the Arab EFL learners' perception of such a combined approach—the AIGames technique in learning vocabulary. Finally, the third research question was tested by analyzing the relationships between students' vocabulary achievement and their perception of using digital vocabulary games and the AI Chat Smith application. The results displayed in the tables and charts show the answers to the three research questions. The study involved two types of variables: independent and dependent. The independent variable had two levels: the AIGames technique (which combines digital games with the AI Chat Smith application), and the traditional instructional method. The dependent variable included the experimental and control group students' vocabulary achievement on the post-test and the experimental group's perception (i.e., their responses to the questionnaire).

Participants

Initially, the school administration had divided the study participants into two sections. Then, students were split into two groups. In the experimental group, 17 students were taught vocabulary with the help of the new AIGames technique. The control group, which included 16 students, was taught vocabulary using the traditional method of instruction as outlined in the *Bridge to Success (Book 7 Teacher's Guide)*. All participants were 7th-grade female EFL learners from a private school in the UAE, with almost eight years of prior English learning experience. Their skill level was lower-intermediate, and their ages ranged from 13 to 14 years. Those students were Arabs from Jordan, Syria, UAE, and Egypt.

The participants' consent was obtained, ensuring them that their personal information and performance would be confidential and that this would be used only for research purposes. The form further assured them that their participation was voluntary and that the survey would not affect their performance in class. They were also informed that they were free to withdraw from the study at their own convenience.

Before these experimental procedures, the experimental and controlled groups were given a pre-test to find any statistical differences in the 7th graders' vocabulary acquisition. The pre-test score showed no significant differences between the two groups, according to the MANOVA test concerning vocabulary knowledge, as seen in Table 1. The pre-test results showed that all the observed differences at the post-test could probably be attributed to the experiment, but not to intrinsic differences existing between groups before the beginning of the treatment.

Table 1. MANOVA Results of the Experimental and Control Groups in Vocabulary Aspects in the Pre-test

Aspect	Group	N	M*	SD	F	Df	Sig.**
Connotation	Experimental	17	2.059	0.966	0.042	31	0.839
	Control	16	2.125	0.885			
Spelling	Experimental	17	2.059	0.899	0.000	31	0.990
	Control	16	2.062	0.772			
Derivation	Experimental	17	2.118	0.781			
	Control	16	2.1875	0.834			
Pronunciation	Experimental	17	2.353	0.786	0.062	31	0.805
	Control	16	2.375	1.088			
Collocation	Experimental	17	2.470	0.799	0.004	31	0.947
	Control	16	2.500	0.730			
Denotation	Experimental	17	2.412	0.870	0.012	31	0.735
	Control	16	2.313	0.793			

Total	**Experimental**	**17**	**13.471**	**2.295**	0.117	31	0.913
	Control	**16**	**13.562**	**2.920**			

***** Mean out of 54, **P* = 0.05

Instruments of the Study

Pre-post-test

We developed a vocabulary test, which was administered as a pre-and post-test. The test aimed to assess the impact of employing the combined technique (*WordWall* Digital games and AI Chat Smith application) on students' vocabulary development, focusing on six key aspects: connotation, denotation, spelling, derivation, pronunciation, and collocation, as shown below. In addition, students were asked to use/say the keywords in grammatical and meaningful sentences.

Section 1. Students were tasked with matching words to their denotative meanings.
Section 2. Students were asked to match words with their connotative meanings.
Section 3. Students were required to match words with their collocations.
Section 4. Students were asked to select the correct derivation form of the given words.
Section 5. Students were asked to select the correct spelling of the given words.
Section 6 students were tasked to select all the words that rhyme with a given word.

The total score for the test was 54, with nine marks assigned to each vocabulary aspect. After the treatment, a post-test was administered to all study participants. The pre-test results were analyzed using SPSS software to find out if there were any significant differences in vocabulary achievement between the experimental and the control group. No significant differences were found, implying that any significant differences found in the post-test results could be attributed to the intervention. The post-test results were also analyzed using SPSS to determine whether there was any significant difference between the experimental and control groups. Finally, the groups in the experiment were compared to find out if there were any differences in the pre-test and post-test scores, to see if there were any improvements in vocabulary learning.

Questionnaire

The researchers designed a six-item questionnaire to assess students' attitudes toward using this technique for vocabulary teaching and learning to answer the second research question, which aims to investigate students' perceptions of the effectiveness of this technique. The

questionnaire was administered to the experimental group students, asking them about their perceptions. We employed a Five-point Likert Scale, ranging from Strongly Disagree (1), Disagree (2), Neutral (3), Agree (4), and Strongly Agree (5). We adopted three levels of agreement: Low (1.00-2.33), Moderate (2.34-3.66), and High (3.67-5.00).

Validity of Data Collection Instruments

To ensure the validity of the vocabulary pre- and post-tests, we consulted three language instructors who reviewed the tests for clarity and alignment with the objectives of the study. They recommended correcting some errors, adding certain questions, and incorporating productive question types that required students to use words in sentences. We carefully considered their feedback and made the necessary adjustments. Test reliability was measured using the test-retest method, with the tests being administered to a pilot group that did not participate in the main study. The reliability coefficient between the test and re-test was found to be 0.85, which is acceptable for this study. Two raters evaluated the students' responses, and the inter-rater reliability was found to be 0.87, further confirming the reliability of the test.

We consulted three English-language education specialists to validate the questionnaire, who reviewed the items to ensure their suitability for measuring students' attitudes. They recommended modifying the scale, clarifying certain items, and correcting some mistakes. The researchers incorporated their suggestions, making the appropriate revisions. Additionally, the reliability of the attitude scale was assessed using Cronbach's Alpha to determine whether the questionnaire items were interrelated, reliable, and consistent. The alpha values ranged between 0.82 and 0.89, indicating that the questionnaire was reliable for achieving the study objectives.

Instructional Software and Method

The vocabulary teaching materials were developed using *Wordwall* (https://wordwall.net/en-gb/community/match-up-games). Match-up and Multiple Choice Questions (MCQ) digital vocabulary games were used to teach the highlighted keywords in three units of Grade 7 English language learners (Experimental group) during the academic year 2023/2024. They included six online game types:

Match-up: Denotation games focus on choosing the meaning of words by flipping cards.

Match-up: Connotation games focus on matching words with connotative meanings.

Match-up: Collocation games focus on matching collocated words.

MCQ: Derivation games ask students to select the correct derivation form of the given word.

MCQ: Spelling games ask students to select the correct spelling of the given word.

MCQ: Pronunciation games ask students to select the words that rhyme with a given word.

Based on the six vocabulary aspects we had picked, covering all aspects of vocabulary, these were fun and engaging games that required the teams to play. The students played the vocabulary games individually or in groups of four, who were supposed to select the answer by clicking on the right answer in the MCQs or dragging the correct answer to match the keywords with what they denote, connote, collocate, or rhyme (See Figures 1-6). After the students had answered all the questions in the exercise, the program gave them corrective feedback, including the students' answers and the correct answers (See Figure 1). This method reinforced the students' correct answers. After every game, students worked in groups to use the vocabulary items in grammatical and meaningful sentences. Then, they used the GPT model AI Chat Smith for corrective feedback on their use of vocabulary within the sentences they had constructed, where AI Chat Smith corrected their sentences. Each group then discussed their original sentences and compared them with the corrected versions suggested by AI Chat Smith (See Figure 7).

Figure 1. *Wordwall* Match-up Collocation Game

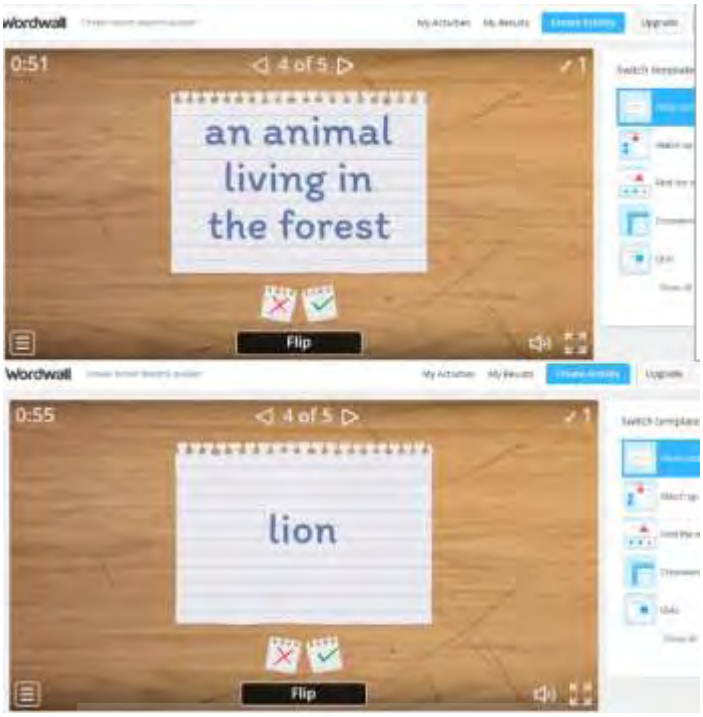

Figure 2. *Wordwall* MCQ Denotation Game

Figure 3. *Wordwall* Match-Up Connotation Game

Figure 4. *Wordwall* MCQ Derivation Game

Figure 5. *Wordwall* MCQ Spelling Game

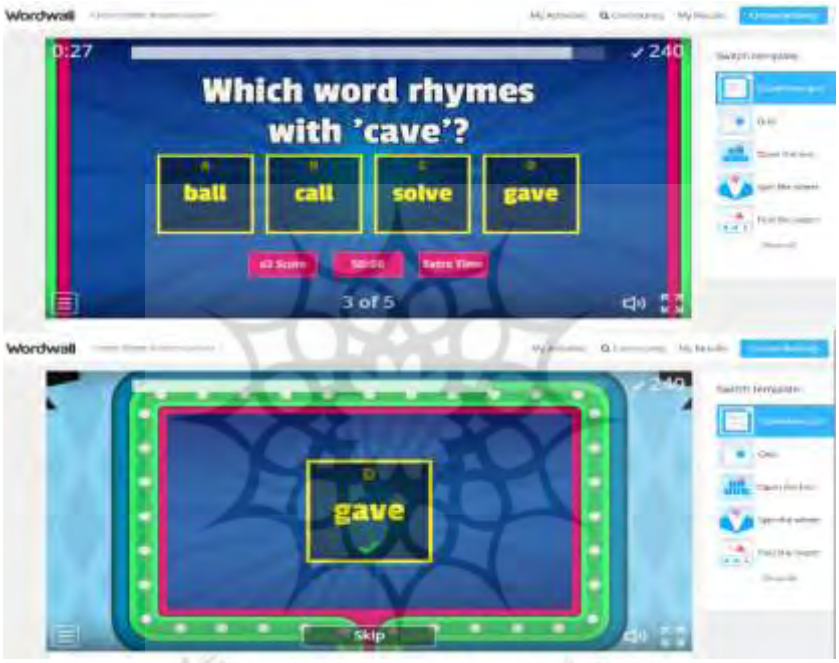

Figure 6. *Wordwall* MCQ Pronunciation Game

Figure 7. Screenshot of AI Chat Smith Correction of Students' Sentences

Data Analysis

Means, standard deviations, and MANOVA tests were used to find the impact of the combined teaching technique (*Wordwall* Digital games and AI Chat Smith application) on developing students' vocabulary aspects, namely connotation, spelling, derivation, pronunciation, collocation, and denotation. Furthermore, the analysis identified the means, standard deviations, degree of agreement for the questionnaire items and the total mean scores. It also determined the reliability through the alpha coefficient for the test-retest method and the inter-rater reliability across two evaluators. Lastly, the correlation between students' attitudes and their vocabulary achievement was determined using the Pearson correlation formula.

The following steps were used in the current study:

1) The school was chosen for logistic purposes, and the participants were randomly assigned to two groups (experimental and control).

2) The test-retest was administered for the pilot group to ensure the test reliability.

3) The pre-test was administered to all participants in the study (the experimental and the control groups) to find any differences in vocabulary before the experiment started.

4) The experimental and control group students studied the same material with the same language instructor for eight weeks.

5) The experimental group was taught the keywords in the Grade 7 Book (*Bridges to Success, Book 7*), using the AIGames technique (*Wordwall* Digital games and Chat Smith AI application).

The control group was taught using the regular teaching method adopted at the selected school.

5) A post-test was administered to all students in the experimental and control groups.

5) Data were obtained from students' answers and the questionnaires and analyzed as per the study variables.

Results

Some promising feedback has emerged regarding the impact of the AIGames teaching technique on vocabulary acquisition among Grade 7 EFL learners in UAE private schools. MANOVA test was used to find any statistically significant differences between the experimental group that used AIGames as a teaching method and the control group that did not use AIGames in teaching concerning vocabulary acquisition and its aspects in the post-test. These findings are summarized in Table 2.

Table 2. MANOVA Results of the Experimental and Control Groups in Vocabulary Aspects in the Post-test

Vocabulary Aspect	Group	N	M*	SD	F	df	Sig.**
Connotation	Experimental	17	7.00	1	0.042	1	.000*
	Control	16	4.88	0.806226			
Spelling	Experimental	17	7.59	1.227743	0.000	1	.000*
	Control	16	5.38	0.619139			
Derivation	Experimental	17	7.24	1.20049	0.001	1	.000*
	Control	16	5.06	0.853913			
Pronunciation	Experimental	17	5.41	1.460258	0.012	1	.000*
	Control	16	3.69	1.014479			
Collocation	Experimental	17	7.18	1.074436	0.004	1	.000*
	Control	16	4.13	1.024695			
Denotation	Experimental	17	7.82	1.131111	0.062	1	.000*
	Control	16	4.56	1.152895			
Total	**Experimental**	**17**	**42.24**	**3.052241**	0.117	1	.000*
	Control	**16**	**27.69**	**2.676285**			

***** Mean out of 54, **P* = 0.05

Table 2 shows statistically significant differences between the mean scores of the experimental and control groups across vocabulary and its aspects due to the teaching technique (AIGames technique vs. regular instruction) in favor of the experimental group. As shown in Table 2, the experimental group outperformed the control group, which did not adopt the AIGames teaching technique. This could be seen from the mean scores, where the experimental group significantly obtained higher scores than the control group. For instance, in the category of 'Connotation', the experimental group achieved a mean of 7.00, while the control group had a mean of 4.88. Similar patterns were observed across all other vocabulary aspects, including 'Spelling' (experimental: 7.59, control: 5.38) and 'Derivation' (experimental: 7.24, control: 5.06).

When examining the total vocabulary score, the mean score for the experimental group was 42.24 out of 54, while the control group had a considerably lower mean score of 27.69. The other overall comparison was evident in a significance value of .000, implying the effectiveness of the AIGames technique in enhancing vocabulary acquisition among EFL students. These findings suggest that the AIGames teaching method would significantly boost vocabulary acquisition among Grade 7 EFL learners, thereby indicating that the AIGames

teaching method would be a powerful way to improve EFL learners' vocabulary acquisition. This method will not only improve EFL students' spelling, derivation, and pronunciation of vocabulary items but also deepen their general knowledge of vocabulary, making it highly effective in the EFL classroom.

Table 3. Means and Standard Deviations for the Experimental Group Students' Attitudes toward Using the AIGames Technique in Learning Vocabulary

Item	Vocabulary Aspect	Mean*	SD	Degree
1	Connotation	4.24	.664	High
2	Spelling	4.06	.658	High
3	Derivation	4.24	.752	High
4	Pronunciation	2.71	.588	Moderate
5	Collocation	4.36	.702	High
6	Denotation	4.18	.728	High
	Total	**3.96**	**.336**	**High**

The second research question investigated the experimental group students' attitudes toward using the AIGames technique for vocabulary learning. To answer this question, means and standard deviations for questionnaire items were calculated, as shown in Table 3. The table shows that most of the students in the experimental group had positive perceptions of the new teaching method, which integrated AI and digital games—*Wordwall* and Chat Smith—to foster vocabulary learning. This was manifested throughout the results, which showed a high mean for most items, except for 'Pronunciation', which scored much lower when compared to other aspects of vocabulary. This marked discrepancy is troubling because it indicates that the technique was not perceived as being very effective for teaching pronunciation. Probably, the more digital nature of the method did not allow sufficient scope for practice or feedback on pronunciation, which is usually more characteristic of traditional and interactive techniques. Furthermore, it can be a reflection of the relative neglect of pronunciation in curricula and low awareness among Arab EFL students regarding its importance (see Abu Guba, 2023).

Another important finding in Table 3 is the total mean score of 3.96, which implies a high level of agreement. The high level of agreement (total mean of 3.96) indicates that the experimental group students were enthusiastic about the innovative AIGames teaching technique that integrated digital games and AI for learning vocabulary. This positive response

might have resulted from the participants' perceptions of the new technique as engaging and compelling, indicating that this innovative technique would be a viable technique for enhancing the EFL learning experiences of EFL students.

Table 4. Pearson Correlation between the Arab EFL Learners' Attitudes and Achievement

	Vocabulary Test	Attitude	
		Correlation	Sig.
1	Connotation	0.059	0.821
2	Spelling	0.107	0.683
3	Derivation	0.255	0.324
4	Pronunciation	0.664	-0.11
5	Collocation	0.024	0.926
6	Denotation	-0.031	0.906
	Total	0.101	0.699

**Correlation significance is at the 0.01 level*

The third research question focused on whether there was any correlation between Grade 7 EFL learners' achievement in vocabulary and their attitude toward using the AIGames vocabulary teaching technique, which involved *Wordwall* Digital Games and AI Chat Smith for vocabulary learning/acquisition. To answer this question, we used Pearson correlation, as illustrated in Table 4. Table 4 shows that Pearson correlation coefficients did not yield any positive correlation between the experimental group students' scores in vocabulary and their attitudes toward using the AIGames technique. The lack of correlation implies that although the participants held a positive attitude toward this innovative technique (i.e., AIGames) in teaching vocabulary, their attitude did not significantly influence their vocabulary achievement. This finding refutes the assumption that more positive attitudes eventually bring more remarkable learning outcomes. The described findings may give the impression that there is no positive relationship between the attitudes of the learners of Grade 7 EFL and the performance in the vocabulary tests when using a combined teaching technique of vocabulary that had integrated Digital Games with the AI application.

Discussion

The first question of the study investigated whether using the AIGames vocabulary teaching technique has an impact on vocabulary acquisition among the 7th-grade EFL learners in UAE

private schools. The results showed statistically significant differences between the two groups in favor of the experimental. The findings of the present study indicated that learners who used the Digital Games and AI Chat Smith technique while learning vocabulary outperformed those who learned vocabulary in the conventional method. The direct corrective feedback students obtained from the hypermedia-annotated words and AI Chat Smith helped them develop their vocabulary acquisition. The findings also revealed that there is a significant difference between the pre-test mean scores of the experimental group in the six vocabulary aspects under investigation and the total mean (13.471 and 42.24, respectively), indicating that Grade 7 EFL learners who used the Digital Games and AI Chat Smith together showed significant improvement in their vocabulary acquisition. Most probably, this significant difference can be attributed to using this technique.

These findings are consistent with previous research on the effect of digital games and AI on EFL learners' vocabulary acquisition. Integrating digital games and artificial intelligence (AI) in learning and teaching vocabulary in the EFL learners' curriculum brings numerous advantages that are changing first-generation pedagogical methods. In this regard, digital games supported by AI Chat Smith would ensure that the learning experiences are personalized, in the sense that the games presented to the learner are adjusted per the learners' proficiency level and their learning style, resulting in increased engagement and improved retention of new vocabulary (Pitarch, 2018; Hassan et al., 2021). Previous research has also shown that using games in language learning not only enhances memory but also creates an activated, relaxed, pleasurable, and motivational ambiance (Huyen & Nga, 2003; Mohamed & Shaaban, 2021). Similarly, Vnucko and Klimova (2023) revealed that using digital games increased students' motivation and interest in actively participating in vocabulary learning.

Since all treatment conditions for both groups (experimental and control) were identical except for the teaching technique (AIGames technique vs. regular instruction), the improved vocabulary performance of the experimental group in the treatment condition appears to be solely attributed to the use of the AIGames technique in vocabulary learning. Cornillie et al. (2012) reported that context-rich and interactive digital games enabled learners to encounter vocabulary in meaningful contexts, which deepens their understanding of word meanings and further improves their vocabulary retention. Furthermore, AI games incorporate natural language processing tools that allow the learner to practice pronunciation, get instant feedback, and rectify learning.

Previous researchers have highlighted the advantages of using games in education. They demonstrated clear evidence of how games could facilitate diverse contexts for language use, information exchange, and opinion expression. Specifically, vocabulary acquisition tends to increase significantly when games are incorporated into learning compared to traditional methods. Games offer students an opportunity to learn various language aspects through games, making them more motivated to learn while also serving as a tool for practice, fluency, and enjoyment. Games also provide a more relaxing, productive, and collaborative learning environment (Wright et al., 1984; Al-Sharafat & AbuSeileek, 2012; Abd El-Aleem , 2014; Ashraf et al., 2014; Iaremenko, 2017; Mohamed & Shaaban, 2021). Similarly, many researchers highlighted the benefits of Artificial Intelligence in language learning and education in general. For example, Baskara (2023) affirmed that ChatGPT results in human-like and coherent text on many topics and that today, AI applications such as ChatGPT can be included, if not already taking place, in the most traditional language teaching curricula. In a similar study, Kostka and Toncelli (2023) confirmed that AI applications like ChatGPT could effectively provide users with a human-like, original text, which is also appropriate for publication.

The second research question aimed to explore the attitudes of the 7th-grade EFL learners in UAE private schools toward using digital games and AI (the AIGames technique) in vocabulary learning and teaching. Li et al. (2022) emphasized that EFL learners generally have positive attitudes toward online gaming environments, which are likely to promote collaboration and enhance engagement. In line with these findings, our study revealed that most of the participants in the experimental group had quite a positive attitude toward using the AIGames technique in vocabulary learning/teaching. This positive response could be because this technique is based on two powerful tools- digital games and AI- that not only motivated the EFL learners but also encouraged them to learn new vocabulary items and use them in correct and meaningful sentences.

Furthermore, incorporating both digital games and AI in vocabulary acquisition fostered a relaxed and engaging atmosphere for learning the target vocabulary items. This method allowed students to receive individualized corrective feedback about their mistakes without the fear of embarrassment in front of their classmates. This finding aligns with other research conducted to measure students' attitudes toward using online games or AI to learn English. For example, Nadeem et al. (2023) indicated that learning through digital games gives students a better sense of involvement and motivation compared to traditional modes and online methods. Similarly, research by Vnucko and Klimova (2023) confirmed that

Digital Game-Based Vocabulary Learning (DGBVL) creates positive and motivating conditions, experiencing a positive impact and increasing vocabulary retention. These studies suggest that DGBVL can be effectively used for vocabulary acquisition, outperforming even traditional teaching methods in English language classrooms.

The results of the current study revealed that collocation games obtained the highest mean, followed by both connotation and derivation games. Spelling games had a slightly lower mean, but all these game types received a high level of agreement from participants. However, pronunciation games recorded the lowest mean with only moderate agreement. This may be attributed to the fact that the game type used in the study was not an ideal option for learning vocabulary, though participants acknowledged that the AIGames technique moderately helped them learn vocabulary. All other digital game types had quite positive means. Lastly, as a further step in this study, we also examined the correlation between students' achievement in vocabulary and their attitude towards using this combined technique in learning vocabulary. The findings showed no correlation between students' vocabulary achievement and their attitude.

Conclusions, Implications, and Limitations

Vocabulary competence is generally recognized as a significant predictor of overall language proficiency, as poor vocabulary directly impacts both receptive and productive skills. Through vocabulary, EFL learners can develop all four basic language skills: listening, speaking, reading, and writing, while mastering the three major constituents of language: vocabulary, grammar, and pronunciation. This study revealed two major findings. First, the research established that the use of both digital games and AI positively affects vocabulary learning outcomes among EFL Arab learners. Second, learners showed a positive attitude towards the combined use of this approach involving digital games and AI in acquiring new vocabulary items. This innovative method facilitated vocabulary acquisition and enhanced students' motivation, confidence, and overall language competence. Third, the results indicate a lack of correlation between the students' achievement in the post-test and their attitudes. This implies that the students' attitude was not influenced by their achievement in the vocabulary test, regardless of whether it was high or low. These findings concur with previous research that digital and online games are effective in language skills development (Wright et al., 1984; Al-Sharafat & AbuSeileek, 2012; Abd El-Aleem, 2014; Ashraf et al., 2014; Iaremenko, 2017; Mohamed & Shaaban, 2021; Baskara, 2023). Moreover, EFL learners generally perceive these new teaching and learning as beneficial means of improving

their vocabulary and language skills (Li et al., 2022; Vnucko & Klimova, 2023; Nadeem et al., 2023).

These findings have some implications for teachers and syllabus designers. Teachers could choose a variety of well-structured language games, either digital or online, to guide EFL learners in developing their vocabulary and other language skills. Curriculum designers should be able to integrate digital/online games into the EFL syllabus. Game types should further be designed to offer key vocabulary aspects like denotation, connotation, collocation, spelling, and pronunciation. While positive attitudes toward technology-enhanced learning are common, the study uncovered nuanced insights. For instance, participants rated collocation games most favorably (M=4.36) but expressed moderate agreement with pronunciation games (M=2.71), reflecting the technique's uneven effectiveness across vocabulary aspects. This granularity informs educators about which components of AIGames are most impactful, adding practical value beyond predictable broad conclusions. In addition, such results add value to the growing literature on digital or online games and AI to vocabulary learning. Given the evolution of this field of educational technology, research must continue, although this task is challenging. Other types of digital/online games that AI would assist, which future studies might examine, could be those leading to the development of various language skills, such as listening, reading, speaking, and writing, as well as vocabulary, grammar, and pronunciation across diverse learner populations.

The findings of this research should be generalized with caution due to certain limitations. The study intentionally combined digital games and AI to explore their *synergistic effect*, as isolating individual variables would require a more complex experimental design (e.g., a factorial study with separate game-only and AI-only groups). While this limits causal attribution, the findings demonstrate the practical efficacy of integrating both tools in real-world classrooms. Future research, however, could deconstruct the variables. In addition, the study was limited to two groups of EFL learners at a private school in Sharjah, UAE. Hence, we may not generalize the results to the larger population. It could only have value when applying the results to similar contexts and student groups.

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