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Effects of Gaming Applications on English Language Vocabulary Learning Among Young Learners in Saudi Arabian Elementary Schools

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ABSTRACT

The past few decades have witnessed tremendous innovations in technology. The digital revolution has immensely reconfigured the way of life. Among the sectors significantly impacted by the digitalization of the world is the education sector. In Saudi Arabia, technology has found widespread use in the education system. This study aimed to investigate whether gaming applications can improve learning English vocabulary among young learners in elementary schools. The study involved 30 students aged between 6 and 11 from two elementary schools in Saudi Arabia. The participants were subjected to a pre-test followed by the treatment during which they were subjected to different gaming applications under the supervision of their parents, teachers, and researcher for one month. After the experiment, the students took a post-test to assess the effects of the gaming applications. The pre-test and post-test scores were subjected to normality and homogeneity of variance tests before analysis. Since the post-test scores violated the parametric test assumptions, the data was analyzed through the non-parametric Wilcoxon's Signed Ranks test. The results show significant differences between pre-test and post-test scores ($T = 455.0$, $Z = -4.79$, $p < 0.001$). The null hypothesis was therefore rejected. These results imply that gaming applications are important in improving English vocabulary learning among young learners in elementary schools in Saudi Arabia. These results therefore inform language teachers in Saudi Arabia to make games an integral part of foreign or second language learning for young learners.

Keywords: Technology, Digital revolution, Saudi Arabia, Education System, Gaming Applications, English Vocabulary, Elementary Schools.

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Chapter 1

1.0 Introduction

Technology continues to influence many spheres of human life and education is no exception. In many regions of the world today, teaching and learning have evolved from the traditional paths which depend fully on textbooks to modern methods where computers, smart-phones and tablets have been integrated into the classroom (Al-jifri & Elyas, 2017). Through these devices, teachers and learners can explore additional content in non-traditional and enjoyable techniques such as through game applications. The use of technology in education can vary depending on the cultural backgrounds of teachers and learners, physical and cognitive abilities of learners, and their proficiency levels (Popova, 2016).

The focus of the current study is on elementary learners in Saudi Arabia who are learning English as a second language, and how their learning experience can be improved by using game applications. I chose to investigate elementary learners because I have taught this population before, and I intend to continue working with elementary learners. Besides, the elementary level of learning is important because it builds the foundation for young learners (Butler, 2016). Learners at this stage, like any other language learners, require an authentic and adequate amount of input for successful language learning. One sure way to access such input is through game apps which are readily available in learners' electronic devices. As Sylvén and Sundqvist (2012) argue, many learners today own these devices and playing games is an integral part of their daily lives. Thus, they can benefit tremendously by learning through these games. These researchers have established that language proficiency can grow through gaming and the current study aims to find out if the same is true in the context of Saudi Arabia.

For a long time, English in Saudi Arabia's public schools has been taught without a major focus on developing communicative abilities of learners (Al-Nasser, 2015). Teaching English, grammar and translation have been taught in Arabic (Al-Nasser, 2015). Additionally, textbook contents as well as the curriculum, mostly consist of unrelated topics and deductive activities which then lead to limited development of crucial aspects such as communication and critical thinking skills. My interest in this area, having gone through this education system, is tied to current research in educational technology that advocates for utilization of modern available means of interactive language learning such as game apps available in electronic devices. According to Al-jifri and Elyas (2017), these devices can boost the motivation of young learners who often get easily bored and disinterested in learning foreign language. The current study is also based on Krashen's Theory of Second Language Acquisition (Krashen, 1981), which advocates for acquisition rather than rote-learning. According to Krashen, language acquisition leads to better performance and mastery of the language while language learned through rote memorization stays in one's memory only for a short time. Acquisition in this case occurs in naturalistic environments, and gaming applications presented to learners in such an environment is ideal for language learning.

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Recently, the teaching of English has become a central point of focus in Saudi Arabiaand is offered from kindergartens and elementary schools (Mitchell & Alfuraih, 2017). Teachers are aiming for more engaging and enjoyable ways of teaching English to keep students interested and motivated in learning the language (Al-jifri & Elyas, 2017). Motivation for the current study was based on current literature which states that gaming apps have proven to present learners at varying proficiency levels with authentic resources for language learning (Sylvén & Sundqvist, 2012). The purpose of the current study was to investigate the impact of gaming on the acquisition of English among elementary learners in Saudi Arabia. The following was the research questions for this study: Is there a positive or negative impact of games gaming applications on learners' vocabulary development?

This study collected data from 30 elementary learners learning L2 English in Saudi Arabia. These learners were between 6-11 years of age. Considering that these are young children who cannot give consent on their own, the researcher observed all the required procedures; participants were recruited by the researcher after seeking permission from relevant authorities in Saudi Arabia. Both quantitative and qualitative data were collected. The investigation was done for one month. Participants performed a vocabulary pre-test then engages in playing selected games while recording the number of times played. Participants were then tested on vocabulary in the middle and at the end of the treatment period, i.e., post-test.

Quantitative data were analyzed through Wilcoxon's Signed Ranks test to compare performance in pre-, and post-tests. The findings present an additional evidence and advocates for the use of modern teaching methods especially by English teachers in Saudi Arabia, as has been recommended by previous researchers (Al-jifri, 2017; Al-rabai, 2014; Mifsud, Vella, & Camilleri, 2013). Also, as Sylvén and Sundqvist (2012) state, gaming is an independent activity and would thus save both teachers' and parents' time to help learners with language homework. In general, the school will benefit because less resources such as computer labs will be required if students can utilize their smartphones in language learning through gaming.

This research paper consists of four major sections: An introduction, the literature review section which is comprised of subsections that touch on various subtopics of the main topic of study, the methodology section, results, and discussions and finally the reference page which lists the articles that have been reviewed in the study.

Chapter 2
Literature review

The purpose of the current study was to investigate the impact of gaming on the acquisition of English among elementary learners in Saudi Arabia. This section presents previous findings related to this topic and establishes the gap that this study attempts to fill. The main points discussed in this literature review include the importance of using technology in general and games apps specifically in language education, the situation of ESL in Saudi Arabia and how it has shifted over time, a summary of previous studies that used game apps in language classrooms including

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their findings and implications, and Krashen's theory of ESL. This theory states the main goal of the current study.

Technology in education

In full realization of the benefits of the English language in the contribution towards the achievements of the vision 2030 in Saudi Arabia, concepts and procedures to be incorporated in English curriculum has been proposed. Among these proposals include the replacement of the traditional English language teaching methods by new techniques which include incorporating technology (Albiladi 2022). This will help in improving the learning outcome leading to adequate preparation of the learners to the job market.

The use of technology in education, especially in teaching languages has been researched extensively in the past few years. Besides using game apps in teaching, educational technology has generally benefited many nations in addressing social challenges. Popova (2016) noted that in Russia, educationists have attempted to use educational technology to assist in bringing up individuals that are socially fit, active and productive. This researcher asserts that through educational technology, learners who are at various stages of development can be instructed appropriately and be provided with the adequate input necessary for their development. The current research reviews the use of game applications in teaching English in Saudi Arabia with an aim to establish the effectiveness of these games and to suggest recommendations on how such technology can be utilized in Saudi Arabian classrooms.

The ministry of education in Saudi Arabia has recently granted the implementation of teaching ESL in primary school at the lowest level (Mitchell & Alfuraih, 2017). Currently, some of the goals that are associated with ESL teaching according to the decrees include acknowledging English as a universal language, acquisition of basic linguistic skills, aid in acquiring enough linguistic ability to spread, explain and defend Islam, preparation for the job market, and to position an individual to be linguistically able to benefit from diverse cultures (Dornyei, Henry, & MacIntyre, 2014).

The attitude of Saudi Arabians towards acquiring English as a Second Language has shifted throughout the years (Mitchell, & Alfuraih, 2017). These researchers state that previously, learners lacked motivation for reasons such as the belief that English as a language would not serve them in an everyday context. In fact, most people argued that the acquisition of English was not necessary for better careers. The attitude shifted towards a more positive direction during the second half of the 90's. The change was centered on the spread of Islam as a religion. In the contemporary Saudi Arabian society, English is viewed as a universal language that is centered on modernization, high economic status and sciences thus making the language a requirement for the labor market (Chomsky & Skinner, 2015). Furthermore, for personal and professional development of Saudi Arabian citizens, it is critical that they learn and speak English as this enables one to interact and work freely and easily with the international community. Therefore, teaching of this language requires modern and enjoyable means so that learners are motivated to acquire the language.

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Incorporating multimedia in the form of graphic novels, movies and Game Apps such as Road race, Simon Says, and Pictionary can be considered some of the most successful strategies in the attempts to turn traditional classrooms to student-centered and communicative classrooms (Al-Fahad, 2009). Al-Fahad argues that ESL games can effectively test tenses and vocabulary of learners. It is important however to point out that the list is endless and that the benefits are not confined to the three attributes listed above. In one recent study conducted by Al-Fahad (2009) on a sample of Saudi Arabian students at the University level concluded that technology indeed enhances communication skills and hence changes the nature of students from a passive mode to an active mode. More specifically, the use of media platforms such as documentaries or movies provides the best platforms for providing authentic speech and conversations (Dashtestani, 2016). Since they are a representation of everyday dialogues, it is important to point out that they provide the best chance for providing a better English teaching/learning experience. While examining the experiences of students who have gone through the process of learning English in Saudi Arabia, Alemsaar (2022) found out that the motivation of the students to learn English was determined by the nature of the environment in which learning took place. The author reports that factors such as anxiety during English lessons reduce the students' motivation to learn while pleasant factors such as enjoyment and fun encourages and motivates the learners. Furthermore, Alemasaar, attributes good English learning outcomes to learning motivation. The result of this study affirms the need to provide a conducive and enjoyable learning environment such as the use of technology. Furthermore, learners have also demonstrated lack of satisfaction with their English skills despite having been taught (Alemasaar 2022). All this is attributed to lack of motivation caused by the traditional classroom mode of teaching. This aspect needs to be considered since research has already described the traditional classroom mode of teaching as ineffective and unsatisfactory (Al – Tamimi 2019).

According to Dashtestani, 2016), Game Apps that take the form of dialogue, such as documentaries or movies, therefore, are the best alternatives for English lessons. Music follows at close range. He states that subsequently, using music and songs in ESL classes results in better comprehension of the language's learning experience as well as a better vocabulary acquisition. A series of interviews conducted on teachers in Saudi Arabia also yielded the results that most learners have a positive attitude when subjected to the use of songs in classrooms (Alrabai, 2014). Additionally, a recently conducted state sponsered survey on teachers' reflections on the subject. The research findings by Alsufi (2014) revealed that approximately 75% of the sampled teachers favor using mobile Game Apps in classrooms. Also, approximately 61% responded positively to the close-ended questions saying that they would allow their students to use Game Apps as reference tools to aid the learning of vocabulary in class. In another study Almufareh (2021) established a positive relationship between learner's attitude towards gaming applications and their academic performance. Amnufareh further notes that positive attitude towards video games also enhanced the motivation to use such facilities in learning with consequent positive feedback on cognitive functions. Furthermore, the concept of attitude towards learning English as

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a second language in Saudi Arabia can also be argued to be a factor of the purpose to which the language is to be used and the direct benefit the student expects to acquire for learning English. Ahmed (2022) investigated the attitude of medical students towards learning English language. His results show that the participants were motivated by the fact that their profession requires adequate mastery of the English language for a successful delivery of medical service. This study thus shows that most students gain the motivation to learn English based on how they intend to use the language especially in their professional life.

On the other hand, approximate 17.5% of the teachers disagreed with the use of technology gadgets to aid the teaching and learning process. These teachers' primary explanation for this decision was dominantly embedded in the fact that most of the students, when allowed to use such gadgets in class, use them for fun activities such as chatting and doing other related activities thus causing unnecessary disturbance to the learning process. Technically, about 82% of the teachers agree that it is possible that the students may use the related mobile phones for other activities rather than the intended purposes and hence that only distracts them from the main intents of the gadgets. This corresponds to several arguments from diverse sources. In summary, roughly 80% of the sampled teachers dispute the use mobile phones in their classroom sessions. The primary argument behind this remains the fact that many Saudi Arabian students are yet to learn the art of using mobile gadgets for educational purposes rather than gaming purposes (Sayer & Ban, 2014). Nevertheless, it is important that Saudi Arabian students learn English as this will ensure that they are adequately prepared for the job market as well as increasing their interaction with the international community.

Video Games and Learning- An Empirical View

Several types of research have been conducted to examine and scientifically explore the role of video games in learning a second/foreign language, and many of these findings point out that, indeed, video games play a central role in enhancing learners' autonomy (Al-jifri, & Elyas, 2017; Al-Nasser, 2015; Alrabai, 2014). They also provide the learners with a variety of ways to practice using the second language. One research study conducted by Sayer and Ban, (2014) on seven adult female Japanese EFL students playing an online game showed interesting results. Four of the seven females in the game were beginners while the other three had some experience with the selected game. The research findings pointed out that the four beginners, as expected, suffered from what can be termed as second language command problems. These learners had poor communication skills at the beginning, but this gradually changed as they progressed in the game. On the other hand, their experienced counterparts showed instant engagement in the use of the second language. They also showed the ease of command during their interaction with other players. In both cases, they adopted the distinct learning strategies and reported positive feedback in a post-interview. A Discourse Analysis was used as a primary source in examining the textual communications among the sampled participants. This empirical study by Sayer and Ban (2014) provides evidence that indeed video games can be useful in language learning. Further evidence on the significance of gaming applications on

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learning outcome is provided by Almufareh (2021). In this study, the researcher used preparatory school participants and noted that the treatment groups which was subjected to technology mode of learning achieved high academic performance as compared to the control group measured in terms of reading ability, correct grammar and the acquisition of English vocabulary. The result of this study emphasizes on the importance of diversification of English language teaching methods which is highly recommended as one of the strategies to eliminate English learning disability among Saudi Arabian learners (Alkhawaldeh and Khasawneh 2021).

An analysis of the Krashen's Theory of Second Language Acquisition

Krashen (1981) presented a series of articles supporting his theory of language acquisition. The theory is exclusively embedded in five main hypotheses. The first one is the Acquisition-Learning Hypothesis. The primary ideology of this hypothesis is that there is a profound difference between learning and acquisition (Girard, Ecalle & Magnan, 2013). While learning occurs in a classroom environment, true language acquisition takes place in a naturalistic environment. The second is the Monitor hypothesis. The primary concern of the hypothesis is with the second language user's monitoring of his or her spoken language. The argument, in this case, is that monitoring occurs exclusively when the language is truly learned and not simply acquired. Consequently, individuals who often prioritize fluency over accuracy technically have lower monitoring activity. The third is the Natural Order hypothesis. Its main argument is that human beings tend to acquire the rules of language in a predictable order. This order is exclusively dependent on a number of variables such as formal simplicity as well as the order in which rules are taught in language classes (Sayer & Ban, 2014). The fourth is the Input hypothesis. The central idea is closely related to the Natural Order Hypothesis. Humans, as language learners, acquire the language by understanding verbal messages or by receiving comprehensive input. This hypothesis occurs along a developmental continuum which is referred to as i+1. 'I' is considered as the previous input that we as humans already possess of the new language. +1, on the other hand, is the new input. The new input in this case gradually increases. The fifth one is the Filter hypothesis which states that a language learner's mind has a filtering device that when active due to fear, for example, inhibits the settling of the input received by the learner. This hypothesis states that the lower the filtering of the input, the higher the learning of the language input.

Some of the most profound critics of Krashen's theory, however, argue that the theory is vague, inaccurate and difficult to understand and measure (Mifsud, Vella & Camilleri, 2013). Critics also argue that the input theory is not viable in the classroom because of the insufficient concrete data that show whether the learner's filter while receiving comprehensive input actively or passively. Contrary to this criticism, empirical studies have established that learning in naturalistic settings such as through Game Apps is more beneficial to learners (Al-jifri, & Elyas, 2017; Al-Nasser, 2015; Alrabai, 2014).

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The previous literature above presents a review of studies on the importance of technology in education and specifically, gaming applications in language classrooms. Despite the criticism of Krashen's theory of language acquisition, empirical studies have confirmed that natural learning can lead to better mastery of a language compared to rote memorization. The current study investigates whether game apps, which are proposed as one way in which learners can acquire a foreign language in a natural-like setting, can have any positive impact on vocabulary development among young learners of English in Saudi Arabia.

The section that follows presents the methodology that the current study intends to follow in collecting data to answer the research questions posed by this study.

Chapter 3
Methodology

The current study aimed to investigate whether young Saudi learners can benefit from using game apps as a medium for language learning. The study followed the format of pre-test, treatment and then post-test to determine if the treatment that learners received had any impact on their language abilities. The language under study is English as a foreign language. Learners took a pretest, then got to play games that are programmed in English for one month, after which they took a post-test. The methodology for this study was motivated by other similar studies that have investigated the effectiveness of game apps in language learning (Al-jifri, & Elyas, 2017; Al-Nasser, 2015; Alrabai, 2014; Sylvén & Sundqvist, 2012). These researchers followed the same procedures and obtained results that now inform this field of research and language teaching.

Participants

This study focused on young learners for two reasons as outlined in earlier sections of this study; English language in Saudi Arabia is currently introduced in kindergartens or elementary levels thus making these young learners an ideal population for study. Secondly, researchers have established that young age is better for learning (Butler, 2016) and this study chose to work with a young population which can easily show change in learning. Besides, young learners can now benefit maximally from learning through game apps since most of them own electronic devices (Sylvén & Sundqvist, 2012).

This study aimed to collect data from 30 elementary students learning L2 English in Saudi Arabia. These students were between 6-11 years of age, so consent for participation was sought from their parents as well as their schools. All participants were first language speakers of Arabic (L1 Arabic) to control for other language transfer effects. These participants were selected from at most two schools since this reduce the effects of different teaching or time schedules across participants, as it would be if participants came from ten different schools. No criteria were followed in deciding on which schools to participate; any easily accessible school was selected for the study. All participants must have learned English for at least three years and at most five years (e.g., if they started in kindergarten). The researcher used a pretest to determine which learners participated in this study. Participants were required to own

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a suitable electronic device such as a smartphone or tablet to participate in the study. Only those learners who scored below 50 points out of the maximum 100 points in the pre-test took part in the study to control for prior knowledge.

Instruments

For this study, instruments included the actual games that learners played as the form of treatment (Endless Alphabet, Endless Reader and Intellijoy), the electronic devices they used (smartphones, iPads, or computers), and the tests that they performed before and after the playing period to measure their level of target language development (pre-test and post-test).

The game applications include The Endless Kids Games and Intellijoy and were downloaded to participants' devices beforehand. The researcher ensured that each student had an electronic device (a phone or tablet) to which these applications were downloaded. If necessary, the researcher rented electronic devices for those participants who did not own any. The Endless Kids Games application has a large collection of games, but two games were selected: Endless Alphabet and Endless Reader. Intellijoy is a game. In Endless Alphabet and Endless Reader, a player is presented with a list of vocabularies to choose from and when one is selected, the player learns each word's spelling, meaning and usage in a sentence. This game is appropriate for vocabulary learning. In Intellijoy, the player is required to help the frog get what it wants and to do that, the player must follow instructions given, and to select appropriate vocabulary to guide the frog to achieve its goal. This game is appropriate for learning both vocabulary and simple phrases and sentences. Also, all three games can be played individually, thus learners were independent during treatment. Learners were required to play one game every day for thirty minutes, and each game was allocated an equal number of days. That is, 10 days for each game.

For both the pre-test and the post-test, two types of tasks were developed: a vocabulary translation task and a phrase or sentence comprehension task. Both tasks were in English since it is the target language. The same tasks were used for pre- and post-tests, and the idea was to measure the level of improvement of these learners from the pre-test to the post-test. For the vocabulary task, the researcher developed a list of vocabularies with the help of these students' teachers. This list consisted of terminology that is frequently occurring in learners' English vocabulary as well as those terms that are used in the selected games that learners were playing, and that learners were not familiar with. For the phrase or sentence comprehension task, the researcher and teacher(s) followed the same procedure and developed a list of simple sentences and phrases in English, some familiar to students, and some unfamiliar to them, borrowed from the games they played. For both tasks, the ratio of familiar to unfamiliar items was 1:3 or 25% to 75%.

Procedure

The first step researcher visited schools in his home area in person to recruit those learners who fit into the outlined demographics. The researcher sought permission from parents and authorities involved to work with learners for two hours after school for the first two days to administer the pretest, download necessary game apps to

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students' devices and try the games out together, and explain the requirements of the study. Later, in the end, another one day was spent to administer the post test.

The second step was to administer the pre-test. The researcher orally tested individual students by asking them to explain to him the meanings of selected vocabulary/phrases/sentences. The researcher read to each participant one word/phrase/sentence at a time and asked them "what does that mean?" in Arabic, and the participants would be allowed to respond/provide a translation in Arabic. The researcher then marked those items which were defined correctly or incorrectly. The post-test follows the same procedure. Each participant took about 10 minutes with the researcher to respond to all items in the test.

The third step was orientation, in which participants were informed of what was required of them; how often to plat the games, how long, and how to record the times played. After orientation, participants were left to play the three games on their own while keeping a record of all the times they played each game. The researcher, through the teacher(s) followed up twice weekly to make sure that learners were on track with playing as required. Regular teaching of English went on as usual in the school(s) but the teacher did not teach these test items unless they incidentally occurred during learning.

Treatment, that is, the period of playing the selected games, was 30 days long. In addition, three days (two for orientation at the beginning and one for the post-test at the end) were required. Participants first performed a vocabulary translation task and a phrase or sentence comprehension test as a pre-test. Those who scored below 50% were suitable for further learning from the game apps and were engage in playing selected games while recording all the times of playing. Learners were required to play these games on their own without any assistance. Participants were tested again using the same tests at the end of the treatment period, i.e., post-test. However, they were not informed that the test was on what they learnt from the games. Responses to the pre- and posttests were graded and readied for analysis.

Data analysis

The data that this study analyzed included the scores from the pre-test and post-test. Preliminary data analysis was conducted using descriptive statistics. Before being subjected to inferential statistics, the data from pre-test and post-test was tested for normality using the Shapiro-Wilk Test and equality of variance using the Levene's test for equality of variance. Significant difference between pre-test and post-test was tested using the Wilcoxon's Signed Ranks test. This was done because parametric assumptions were violated even after data transformation.

From the learners' records, the researcher retained those participants who played more than half the required times for each game, that is, five times out of ten. If any learner had records lower than five for any game, this data was dropped from the set because that might imply that the learner did not gain a lot from the game. Data was then grouped in terms of terminology/phrases/sentences from each game, and learners' performance on those items in the pre-test and post-test, in readiness for statistical analysis. The findings depicted the amount of learning for these participants and were used to inform inclusion of game apps as a medium for language learning, even if

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partially, by English teachers in Saudi Arabia (Al-jifri, & Elyas, 2017; Al-Nasser, 2015; Alrabai, 2014).

Limitations

This study faced several limitations in data collection and analysis. During treatment, learners continued with regular school and learning English. Besides, other incidental forms of learning such as through watching TV at home also occurred. These conditions also developed learners' vocabulary and overall language ability. Therefore, it was difficult to accurately measure the level of language development caused by the games. Secondly, since these participants are young learners, it was difficult to keep them on task throughout the thirty days, and some of them failed to fulfil the required number of times of playing each game. Regardless, the researcher kept close contact and monitored the treatment period to make sure that as much valid data as possible was obtained.

In summary, this chapter presents the methodology of this study that determined the overall idea presented by this research. The chapter starts with an explanation of why this methodology was selected, and its effectiveness in answering the research question. It goes on to outline the details of each of the sections i.e., the participants, instruments and procedure for both data collection and analysis, clarifying all the steps that was followed in obtaining and analyzing the data. The chapter that will follow will present the results of the study from the statistical procedures that was run after data collection.

Chapter 4
Results

Technological advances and the widespread digital space the world have 2encountered in recent years have revolutionized several aspects of life. Technology is today used in several parts of life and teaching has not been left behind. In this regard, this study investigates the use of Technology in teaching. Specifically, it focuses on using gaming applications in teaching English language to young non-native English-speaking learners in Saudi Arabian elementary schools. The study seeks to establish whether these gaming applications are effective and can significantly improve learning English vocabulary. The materials and methods used in data collection were well described in chapter three. The participants were subjected to a vocabulary pre-test, after which they were allowed to use gaming applications for one month, after which they took a post-test assessment, and the scores were recorded. This chapter explores this issue through inferential statistics. Therefore, this chapter aims to explore the data and establish the effects of gaming on vocabulary learning. The data were analyzed using the paired sample within subject procedures. Screening for the violations of the assumptions of normality and equality of variance was conducted. The chapter is organized into three subsections. These include a brief introduction, which details opening statements to chapter 4, a brief overview and the purpose of the study and data analysis section where the findings are presented in a simple, coherent manner. The last section is the conclusion, where concluding

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remarks are made based on the study findings. All the data analysis was conducted using SPSS version 26 and excel. The following hypothesis was tested in this study.

Null hypothesis

Gaming does not significantly improve vocabulary learning among young students in Saudi Arabian schools.

Alternative hypothesis

Gaming significantly improves vocabulary learning among young learners in Saudi Arabian schools.

Since the study investigated whether gaming improves learning, a directional hypothesis was used. The test conducted was therefore one-tailed.

Data analysis and findings

The study participants involved 30 young learners taking L2 English subjects from elementary learning institutions in Saudi Arabia. The minimum age of the participants was six years, while the maximum was 11 years. The data were subjected to preliminary analysis and described using descriptive statistics. These included the measures of central tendency and the measures of dispersion. The descriptive statistics were conducted using excel. The results are shown in Table 1. All the data were presented in two decimal places.

Pre-test score

The minimum value for the pre-test score was 3, while the maximum score was found to be 14. This gave a range of 11. Also, the 95 % confidence interval was 7.13 ± 0.93. This implies that when a student is picked randomly, there is a 95 % confidence that their pre-test score will lie between 6.20 and 8.06.

Measures of central tendency

The mean was 71.3 ±2.50 with a standard error of 0.46 and a sample variance of 6.26. The median score was 7.00, while the score with the highest frequency was 7.00. Since the mean, the median, and the mode were approximately equal, this distribution can be assumed to be normally distributed. However, since the mean is higher than the median, it can also be argued that the data for the pre-test follows a normal distribution.

Kurtosis and Skewness

Kurtosis is a statistic that indicates how far the observed distribution deviates from a normal distribution. On the other hand, skewness shows the level of "peakedness" of the distribution compared to the standard bell-shaped curve. The Kurtosis and skewness values were 0.46 and 0.40, respectively. The results show that the kurtosis and skewness are within acceptable levels for a normally distributed data set. It is observed that from the descriptive statistics alone, it is difficult to tell whether the pre-test data set follows a normal distribution.

Post-test score

The minimum value for the post-test score was 19, while the maximum score was 30 and a range of 11. The 95 % confidence interval for the post-test score was 25.87 ±

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1.16. This implies that when a student is picked randomly, there is a 95 % confidence that their post-test score will lie between 24.71 and 27.03.

Measures of central tendency

The mean was 25.87 ±3.10. The standard error was 0.57, while the sample variance was 9.64. The median score was 26.50, while the mode was 24.00. Since the mean is less than the median, this data set can be assumed to be negatively skewed. However, since the measures of central tendency do not give a clear picture of the distribution of the post-test data, further analysis is needed to confirm whether it follows a normal distribution.

Kurtosis and Skewness

The Kurtosis and skewness values for the post-test data were -0.94 and -0.39, respectively. Again, these values are within acceptable levels for a normal distribution. Just like for the pre-test data, it is difficult to tell whether the post-test data follows a normal distribution using the descriptive statistics alone.

Table 1. Descriptive statistics of pre-and post-test data sets

Statistic	Pre-test	Post-test
Mean	7.13	25.87
Standard Error	0.46	0.57
Median	7.00	26.50
Mode	7.00	24.00
Standard Deviation	2.50	3.10
Sample Variance	6.26	9.64
Kurtosis	0.46	-0.94
Skewness	0.40	-0.39
Range	11.00	11.00
Minimum	3.00	19.00
Maximum	14.00	30.00
Sum	214.00	776.00
Count	30.00	30.00
Confidence Level (95.0%)	0.93	1.16

Preliminary analysis of the data through descriptive statistics shows that the post-test scores (Mean = 25.87, SD = 3.10) were higher than the pre-test scores (Mean = 7.13, SD = 2.50). This is illustrated in figure 1.

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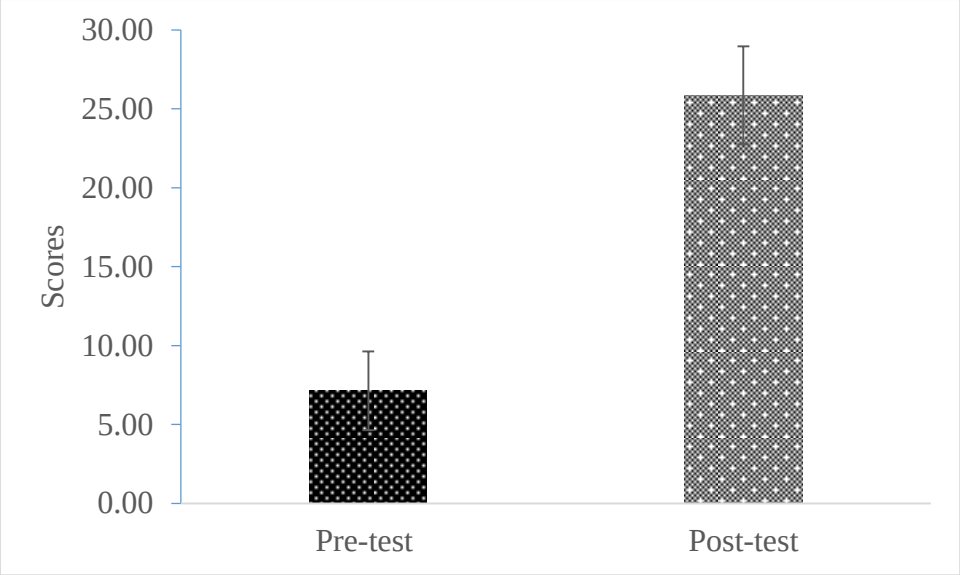

Figure 1. Comparison of Mean of Pre-test and Post-test scores

Testing for Assumptions of Parametric analysis tests

Inferential statistics concerns making conclusions about the population based on the information contained and derived from a sample. For the inference to be accurate, some statistical procedures must be followed. These include testing for the assumptions of normality and homogeneity of variance. Normality was tested through the Shapiro-Wilk test, while homogeneity of variance was tested through Leven's test for equality of variance. The results are shown below. According to table 2, the pre-test did not differ significantly from a normal distribution ($p = 0.06$) and was therefore found to be normally distributed. On the other hand, post-test data failed the normality test at a 95 % confidence level ($p = 0.05$). This distribution differed significantly from a normal distribution. The data was therefore transformed by taking the $\log_{10}$ for each observation. However, still normality was violated since the p values were ($p = 0.031$) and ($p = 0.029$) for the pre-test and post-test scores respectively. While testing for equality of variance using Levene's test, there was no significant difference in the variances of the pre-test and post-test data ($p = 0.06$). The distribution of the data for the pre-test and post-tests are shown in figures 2 and 3.

Table 2. Normality test for Pre-test and Post-test

	Kolmogorov-Smirnov[a]			**Shapiro-Wilk**		
	Statistic	**df**	**Sig.**	**Statistic**	**df**	**Sig.**
Pre-test	.145	30	.106	.934	30	.064
Post-test	.154	30	.067	.930	30	.049

a. Lilliefors Significance Correction

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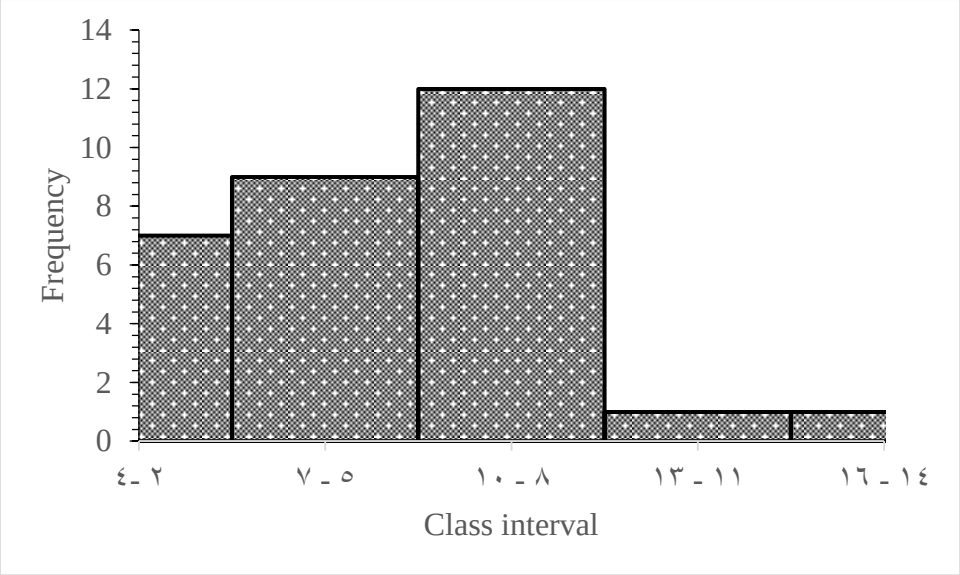

Figure 2. Histogram of Pre-test

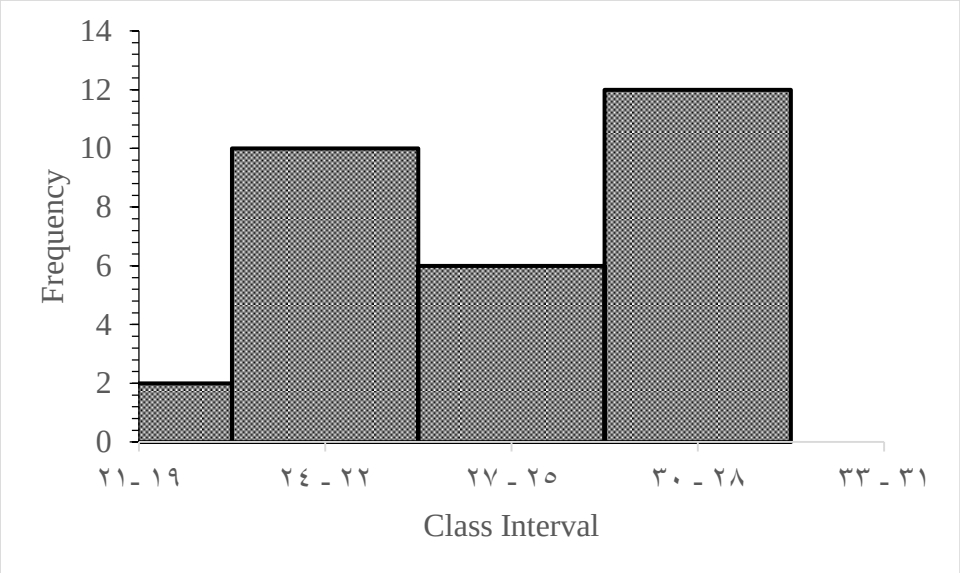

Figure 3. Histogram of Post-test

Wilcoxon's Signed Ranks Test

Given that the data failed the normality test, significant difference between the pre-test and the post-test scores was tested through the non-parametric Wilcoxon's signed ranks test. The results show that the number of observations with negative ranks, the number of individuals who scored less in the post-test, was zero. This implies that all the scores for the post-test were higher than their corresponding pre-test scores (Table 3). These results were confirmed by Wilcoxon's Signed Ranks test which showed that the mean of post-test scores (M = 25.87, SD = 3.10) was significantly higher than the

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mean of pre-test scores (M = 7.13, SD = 2.50), (T = 455.0, Z = -4.79, p < 0.001) (Table 4).

Table 3. Ranks for the pre-test and post-test scores

		N	Mean Rank	Sum of Ranks
Post-test - Pre-test	Negative Ranks	0[a]	.00	.00
	Positive Ranks	30[b]	15.50	465.00
	Ties	0[c]		
	Total	30		

a. Post-test < Pre-test
b. Post-test > Pre-test
c. Post-test = Pre-test

Table 4. Wilcoxon's signed ranks test output for pre-test and post-test scores

	Post-test - Pre-test
Z	-4.790[b]
Asymp. Sig. (2-tailed)	.000

a. Wilcoxon Signed Ranks Test
b. Based on negative ranks.

This analysis shows that post-test scores were significantly higher than pre-test scores. The null hypothesis was therefore rejected. The results, therefore, show that gaming significantly improves vocabulary learning among young learners in Saudi Arabian schools. This chapter presented the results and analyses conducted on the data. The results are presented visually using graphs, descriptive and inferential statistics. The relationship between gaming apps and English vocabulary learning is well established.

In summary, according to the analysis results, gaming applications effectively improve learners' English language learning outcomes. In the next chapter, the report proceeds with a discussion of the findings of this study. Comparisons with previous studies are made. Finally, conclusions and recommendations on using gaming applications in teaching English language among young learners in Saudi Arabia are made.

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Chapter 5
Discussions

In the previous chapter (Chapter 4), an analysis was conducted on the collected data to establish the effects of gaming applications on English language learning among young learners in Saudi Arabia. The analyses showed that the use of technology such as gaming applications is important in promoting learning of English as a second language among young learners in Saudi Arabia. In this chapter, these findings are discussed in more detail. The importance of learning English language in Saudi Arabia, the challenges facing its learning, and the use of technology as part of the solutions to overcoming these challenges are discussed. In addition, the chapter compares these findings with previous work on a similar subject. Finally, the chapter ends with a conclusion and recommendation on the use of technology in learning English as a second language in Saudi Arabia. The conclusions and recommendations are made based on the results of this study.

Challenges facing the use of Technology in Saudi Arabia schools

In full realization of the importance of English towards the development of Saudi Arabia in terms of her technological advancement, promotion of the Islam religion and relationship with other countries, the government requires that the people should learn and acquire knowledge of English language. This, therefore, forms the basis for English teaching in Saudi Arabian schools. English has thus been recognized as the first foreign language and has become deeply rooted in the Saudi Arabian education system. Despite the widespread teaching of English in Saudi Arabian schools, challenges have been cited, especially those related to the mode of teaching, which, in most cases, the learners have stated to be unsatisfactory. According to Al – Tamimi (2019), English learners have problems with the traditional teacher-oriented classroom mode of teaching. Furthermore, it has been observed that most graduates are still unable to adequately express themselves in proper English despite studying English in school. Al-Tamimi further reports that learners prefer student-centered learning techniques such as the use of technology such as gaming and videos, which are more attractive, and enjoyable, and reduce interaction with the teachers.

Despite the widely recognized benefits of using technology in teaching, studies have identified some major barriers that need to be addressed. In general, the integration of Technology in Saudi Arabia's education system faces challenges related to lack of access to the required resources, the poor attitude among learners and educators, lack of experience in using technology, and privacy issues (Alhubaishi & Aljuhani, 2021). Research has indicated that Saudi Arabian teachers face problems such as inadequate technical knowledge and training on the use of Technology in teaching (Alabdulaziz & Higgins 2016). In addition to these issues, further research investigating the use of technology among young students in high school has cited problems related to breakdowns, security, and lack of proper ICT teaching techniques (Alkahtani 2017). In a similar study, while investigating the factors hindering the use of technology in primary schools, Alshmrany and Wilkinson (2017) found out that computer illiteracy, lack of confidence when handling ICT equipment, attitude, culture, and socio-

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economic status are some of the factors that have prevented the use of technology in elementary schools.

Effects of technology on English learning

Despite these challenges, the benefits that come with it cannot be ignored. The results of the current study showed that technology has a significant positive effect on learning English. This was seen in the post-test scores, which were significantly higher than the pre-test scores. The benefits of using technology in teaching English among young learners have been demonstrated. Studies have shown that schools that use technology in teaching English achieve high scores in their exams compared to those students learning through the traditional methods (Mofareh 2019). The high academic performance earned when using technology is attributed to increased motivation and enhanced understanding of the concepts. Furthermore, technology ensures that students are self-reliant since it reduces the teacher's intervention. It is also important to note that technology such as gaming applications are highly interactive and promote practical learning, which helps the students maintain long-term memory.

The beneficial use of video games in learning has also been demonstrated by Cheung and Ng (2021). This study established a positive relationship between gaming videos and academic achievement when the videos were used as part of learning. They attributed this to technology's ability to provide learning, fun, and motivation (Hashemi 2021). In addition, they attribute the high academic achievement to the interactive nature of technology mimicking a self-driven practical learning approach. The cognitive benefits of digital learning among young children have also been demonstrated by Parkash (2022). According to this study, the use of digital technology in learning has beneficial effects on children's cognitive ability. The author shows that such learning platforms promote the problem-solving ability of children. This happens as they engage in different gaming activities that require thinking, decision making, and execution of mental tasks. In this process, the children become attentive, concentrate, learn and develop information processing skills. In addition, the children build self-confidence and grow the ability to express themselves. The children, therefore, become inquisitive, and this enhances long-term learning. The positive cognitive development is attributed to the fact that digital learning platforms are practical, and learner centered.

The results presented in this study also agree with the work of Hai (2022). In this study, conducted in a non-native English-speaking environment in Vietnam, it was established that using games in learning English vocabulary enhanced the learning process leading to high academic achievement. The author demonstrated that students who participated in video games significantly improved their post-test scores compared to the control group. This achievement was attributed to the friendly learning environment motivated by video games. In another study, the positive effects of gaming applications on academic achievement have been demonstrated (Nguyen 2022). This has been attributed to a friendly and conducive learning environment and different learning and teaching approaches presented by the applications.

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However, video games in learning, especially among children, should be used under maximum control and regulation of caretakers such as teachers and parents. Research has shown that such gaming applications can be addictive when used beyond the intended purpose leading to adverse effects such as loss of memory, poor attention, speed of information processing, and poor writing, expression, and thinking capacity (Farchakh et al., 2020). Such cognitive impairments can have serious negative academic performance in the long run. Similarly, challenges such as regular updates and subscription for such applications has been cited as discouraging factor towards their use in teaching. Teachers have also mentioned distractions such as surfing and browsing into other non-academic issues (Nguyen, 2022).

Conclusion and recommendation

Based on this study's results, it is concluded that gaming applications effectively improve English learning for non-native English-speaking learners. Therefore, for teachers to experience improved English learning outcomes, this strategy needs to be incorporated into the learning process.

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