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The Impact of Using a ChatGPT-based Application to Enhance Saudi Students' EFL Vocabulary Learning

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Abstract

This study investigates the impact of using a ChatGPT-based application on enhancing vocabulary learning among Saudi high school students. A quasi-experimental research design was adopted, involving an experimental group and a control group. Data were collected from 57 female high school students using pre- and post-tests and a follow-up questionnaire to explore vocabulary learning and students' attitudes. The findings of the study revealed statistically significant improvement in learning vocabulary among the experimental group compared to the control group. In addition, the students expressed positive attitudes toward the application. In general, the results show the great potential that ChatGPT would bring to the teaching and learning of EFL vocabulary.

1. INTRODUCTION

Vocabulary learning is the essence of language acquisition (Decarrico, 2001). Schmitt (2008) asserted that an effective vocabulary learning process involves four partners: learners, teachers, content writers, and researchers. Researchers amass the body of literature that provides guidelines to the other partners on the valid pedagogies of vocabulary learning. For instance, the acronym MALL (mobile-assisted language learning) is well recognized in language learning research. Researchers investigate the various aspects that technology plays in learning vocabulary (See Al-Ahdal & Alharbi, 2021).

In this study, we explore the impact of using a recent sophisticated tool (app) based on ChatGPT on vocabulary learning. ChatGPT (Generative Pre-trained Transformer) is an intelligent language model based on GPT-3.5 architecture that uses algorithms along with big data and big computing power (Cheng et al., 2023). This model has the capacity to extract information from massive text data and generate human-like output and answers in the form of natural language (Yu, 2023). Normally, popular apps need months or perhaps years to reach their first million users. For instance, Facebook needed 300 days, Instagram 75 days, and Twitter 720 days. In contrast, ChatGPT, developed by OpenAI, reached this number of users in only five days (Biswas, 2023). Such a favorable response to this technology indicates its

promising future. However, it is worth noting that educators should take into consideration the ethical and pedagogical implications of using any AI-enabled application in order to ensure safer use of this technology (Aljabr & Al-Ahdal, 2024)

Shidiq (2023) stated that artificial intelligence has remarkable features, such as the ability to adapt, learn, solve problems, make decisions, and process human language. Accordingly, such qualities can support advancement in the world of education and learning. Applications of AI-based systems in education include various options, such as virtual monitors, voice assistants, innovative content, smart classrooms, automatic assessments, and personalized learning (Shidiq, 2023). In this study, I will investigate how a ChatGPT-based tool can be utilized to assist English vocabulary learning for ELF students in high schools.

ChatGPT is a revolutionary technology that is currently attracting a great deal of public attention. The prime feature of ChatGPT is the ability to produce rational, coherent, and human-sounding responses to both written and voiced input. According to Kalla and Smith (2023), ChatGPT has many advantages. The first one is it produces natural and coherent responses, which foster engagement in human-like conversations. The second advantage is the scalability, which allows it to handle multiple conversations and deal with multiple users simultaneously. A third remarkable advantage is customizability since it can be directed to do specific tasks based on different specific needs. A fourth advantage is the efficiency in producing professional responses and reliable information in a short time.

In this study, we aim to use ChatGPT to help Saudi high school students learn English vocabulary. All the above-mentioned advantages can be utilized in a ChatGPT-based application tailored specifically to provide students with multiple choices in learning vocabulary. Additionally, Kostka & Toncelli (2023) clarify that at the time of their work, research on the use of generative artificial intelligence in the field of English language teaching is relatively unexplored. Given this limited empirical investigation into artificial intelligence in general and the impact of using ChatGPT for vocabulary learning specifically, this study aims to highlight the contribution that ChatGPT could make to foreign language vocabulary learning.

In traditional language learning classrooms, students rarely have opportunities to practice their target language (Fryer & Carpenter, 2006). This is because when teachers attempt to provide situations for learners to practice their language, they often face obstacles, such as time duration, students' willingness or shyness, and difficulty in providing appropriate feedback.

This study will first explore the impact of using a ChatGPT-based application as a learning tool and how it can enhance learners' vocabulary learning. Second, the study will show how this sophisticated tool might improve learners' motivation by providing them with greater engagement and variety. Third, it will increase the awareness of EFL teachers and content designers of the potential that ChatGPT and artificial intelligence possess as tools to enhance the language learning process. Finally, the study will draw the attention of second language acquisition (SLA) and computer-assisted language learning (CALL) researchers to explore this promising new field further to fill in the gaps and resolve the limitations encountered in this pursuit.

In recent years, the use of technology has entered every aspect of the language-learning process. Researchers are working prolifically to evaluate the impact of the different technologies adopted in language learning and teaching. For instance, from 2014 to 2019, 398 articles were published on technology-assisted language learning, which discussed 23 types of technologies (Shadiev & Yang, 2020). The results of studies in this area can inform the guidelines for educators, content designers, and instructors in utilizing, applying, and improving technologies to attain the best outcomes in the field of language learning.

Saudi Arabia has a government-directed plan for digital transformation that includes education, healthcare, and telecommunication. Regarding education, one goal of this plan is to convert traditional classes into smart ones (Omar & Almaghthawi, 2020). In accordance with achieving such a goal and due to the limited empirical investigation into the impact of using ChatGPT tools for vocabulary learning as stated previously, this study attempts to investigate the impact that a ChatGPT-based tool could make on foreign language vocabulary learning in Saudi high school classes.

This study investigates the impact of using a ChatGPT-based application on EFL students' vocabulary learning. It will provide an overview of the potential advantages and limitations of using such technology in vocabulary learning. It will also examine students' perceptions of this technology. The study will address the following questions:

- To what extent does the use of a ChatGPT-based application lead to improvement in EFL learners' vocabulary learning?
- What are the participants' attitudes toward using the ChatGPT-based application to learn EFL vocabulary?

2. LITERATURE REVIEW

2.1. Vocabulary Learning in EFL

Folse (2004) highlighted that vocabulary has equal importance to other language learning areas, including grammar. Herberston (2010) argued that the communication message can be partly conveyed even without accurate grammar; however, without lexis, the message cannot be conveyed in the first place. Moreover, Ilmiddinovich (2021) asserted that vocabulary is an indispensable part of language learning since it is required to improve other language abilities, including reading, writing, speaking, and listening.

Some research in L2 vocabulary learning has focused on the relationship between vocabulary size and spoken or text comprehension. For example, Laufer (1989) claimed that knowing 95% of the words in an English text is adequate for comprehending the text. Such studies have asserted the importance of improving L2 vocabulary competence.

2.2. Teaching Vocabulary

Hunt and Beglar (2002) presented three approaches to vocabulary instruction: (1) incidental learning of vocabulary happens when teachers provide opportunities for learning vocabulary through extensive reading and listening; (2) explicit instruction takes place when teachers determine which words students need to learn and presents them with elaborations; and (3) independent strategy development involves practising guessing from the context and using dictionaries and other resources. The method the application in this study will follow is a combination of all these approaches.

There are several principles underlying successful vocabulary learning and teaching: aim, need, frequent exposure, and meaningful presentation (Mansoor et al, 2023; Shejbalová, 2006; Wallace, 1988). In this study, these principles apply to a specific targeted list of vocabulary that matches the needs and interests of learners. The presentation of new words to learners should be meaningful and unambiguous, and their exposure to the vocabulary must be frequent and repetitive.

These principles are embedded in the application of the ChatGPT used in this study. The vocabulary list will be prepared in advance and derived from the learners' school curricula. The presentation of the vocabulary will vary according to the learners' needs and interests. The vocabulary will also be presented in a specific context with further explanation and immediate feedback if needed. The employment of such technology is expected to be highly fruitful.

2.3.Technology in Teaching Vocabulary

Hao et al. (2021) reported that technology-assisted L2 vocabulary learning is more effective than traditional instructional methods. Their meta-analysis covered 45 studies conducted between 2012 and 2018. Generally, the results of these studies showed that technology facilitates incidental vocabulary learning. Moreover, the use of technology was not restricted to classroom settings. Additionally, it afforded opportunities for productive learning.

Hirschel and Fritz (2013) argued that a valuable characteristic of the use of computers in learning vocabulary is their ability to present information in varied contexts. Their study showed a 12% higher gain in learning vocabulary in the treatment group compared with the control group, who used traditional pen and paper methods.

Hassan Taj et al. (2017) conducted a study with 122 students and applied a model that used computers and mobile phones to assist EFL vocabulary learning. The results showed that the treatment group scored significantly better on the post-test than the control group. Their study, together with many other studies, indicates that technology-enhanced language learning has promising potential for future education.

2.4.Artificial intelligence

Innovations and developments in computers, machines and other artefacts characterized by human-like cognitive abilities, learning, adaptability, and decision-making capabilities have led to the growth of the field of artificial intelligence (Chen et al., 2020). Research in AI has become an important part of almost every field including engineering, science, education, medicine, business, accounting, finance, marketing, economics, stock market and law to name a few (Oke, 2008). The importance of research in AI is derived from two factors (1) to provide a full understanding of the basic structure of AI, especially for those newly introduced to the field, and (2) to keep up with huge interest and promoted investment in AI facilities recently (Oke, 2008). Artificial intelligence is a very broad field that falls into many areas including reasoning, programming, artificial life, expert systems and the other twelve categories. My focus among AI areas in this work is on Natural Language Generation. NGL systems are computer software that depends on artificial intelligence to produce human-like language (Oke,2008). One excellent and recent example of such NGL systems is ChatGPT.

2.5.History of ChatGPT

Warschauer and Healey (1998) distinguished four stages of CALL: behavioristic CALL of the 1960s and 1970s, communicative CALL of the 1970s and 1980s, integrative CALL of the mid-1990s, and intelligent CALL from 2000 onwards. The intelligent CALL stage is about how the intelligent power of computers can best be utilized to maximize interaction with learning material, provide effective feedback and guidance for learners, and present comprehensible information through multiple mediums that suit each student's individual style.

Coniam (2008) evaluated six of the most common chatbots with the potential to be used in the field of language learning. All these chatbots were developed from an initial chatbot, Eliza, which was released earlier and operated with text output only. The author's evaluation revealed that the Lucy chatbot and Dave chatbot have the most attractive appearance, as well as high-quality speech. On the other hand, Lucy chatbot and George chatbot are the most accessible as second language tools in that students can easily access their transcripts and conversations. Jenny chatbot has a link to an online dictionary for assistance and information. Cybelle chatbot has the realistic appearance of an avatar with 3D turns body waves and a personal details file. Ultra Hal Assistant is accurate when it comes to the voice recognition of the input. Conaim (2008) predicted that as technology steadily evolves, the artificial intelligence of these chatbots will probably overcome many of the problems he identified.

This prediction is not far off with the emergence of ChatGPT. Generative Pre-trained Transformer 3 (GPT-3) is a language model with a huge scale created by Open AI. It can produce text with 175 billion parameters and has been trained on a vast quantity of data (Brown et al., 2020). Firat (2023) argued that ChatGPT is a useful tool for educational and autodidactic educational purposes. In addition, ChatGPT can be accessed through various mediums, such as websites, smartphone apps, and messaging services, to name a few (OpenAI, 2023). It can also deal with different types of input, including texts and voice, and respond synchronically to several users simultaneously. Accordingly, it presents tailored and interactive services to learners in a natural and conversational way (Firat, 2023).

2.6.ChatGPT for Educational Purposes

The key feature of ChatGPT is its ability to understand and respond in the form of human-like language (Biswas, 2023), thus offering the experience of a natural and intuitive conversation centered on relevant input. According to Biswas (2023), this technology fits the field of education perfectly for many reasons: (1) the assistance that ChatGPT provides users is tailored to each individual's needs and preferences; (2) it increases the interaction and engagement of learners, which can also improve their motivation; (3) it can act like a tutor or monitor by providing immediate feedback and recommending relevant material and resources. Collectively, these features can promote learners' success, enhance their learning processes, and serve several potential pedagogical uses.

2.7.ChatGPT for Language Learning

ChatGPT is basically a huge language model; hence, its use in language learning might be one of its best applications. Kim et al. (2023) explored how ChatGPT can be utilized as a second language learning tool and applied it to ESL Korean learners to evaluate its feasibility and suitability. The results revealed the promising potential of ChatGPT as a learning tool.

However, the researchers recommended further research in this area using different language settings and skills.

ChatGPT aids students' English language learning in many ways (Bin-Hadi et al., 2023). It provides feedback for students on their language use, which scaffolds the learning process. It also acts as a partner in practicing language skills, and it recommends further practice activities.

Ali et al. (2023) investigated how ChatGPT affects students' motivation for foreign language learning. They designed a quantitative study to gather information from 80 students and teachers. The results suggested that ChatGPT can positively affect students' motivations to develop their reading and writing skills. However, it might not have an equal effect on motivation regarding listening and speaking skills.

Research on utilizing AI technologies to produce high-quality dialogue content is relatively limited (Young & Shishido, 2023). Accordingly, Young and Shishido (2023) investigated the ChatGPT system to determine its ability to generate high-quality dialogue material suitable for ELF learners. The results showed that the dialogues were comprehensible and helped the learners grasp a considerable amount of the vocabulary used. This finding highlights the promising future of ChatGPT integration into EFL education through the provision of valuable learning resources. This proposed study will examine the effectiveness of ChatGPT specifically regarding vocabulary learning for EFL students.

Many recent studies in the field focus on learners' attitudes and perceptions of utilizing ChatGPT in language learning. Tran et al. (2024) study shows that the intentions of learners in using ChatGPT have been affected by their positive attitudes, subjective norms and behaviour. Solak (2024) has also conducted a study on how both learners and teachers perceive the use of ChatGPT in language learning. These results show that ChatGPT is perceived positively as a useful tool for language learning and teaching.

Lo et al. (2024) explore the application of ChatGPT in ESL/EFL education and related research issues. They conducted a systemic review of 70 empirical studies on ChatGPT within 1.5 years following its release. The findings of the review reveal that most of the research conducted investigates learners' use of ChatGPT in writing. Less studies focused on the effect of its use on learners' performance and motivation. Furthermore, the influence of ChatGPT on other language skills such as reading, speaking and listening needs to be scientifically investigated.

2.8.ChatGPT for Vocabulary Learning

Second language vocabulary acquisition has recently become a captivating issue for researchers, teachers, learners, curriculum designers, and everyone interested in L2 acquisition (Coady & Huckin, 1997). Hubbard (2009) demonstrated the promising future of chatterbots in research for both SLA and CALL. Fryer et al. (2019) pointed out that since chatterbots have massive lexicons, they are perfect tools for conversation practice and vocabulary acquisition. Firat (2023) stated that "it is crucial to keep in mind that ChatGPT is still a relatively new technology, and more study is required to properly grasp its potential and restrictions" (p. 4). To fill this gap, this study aims to explore how the use of ChatGPT can enhance vocabulary acquisition.

Interactionist theory asserts that conversational interaction is necessary for effective language acquisition (Alsadoon, 2021). Input enhancement theory, on the other hand, emphasizes the importance of comprehensible input in second language acquisition (Long, 1996). Long (1996) focused on the advantages of interactive input over non-interactive input. Another substantial feature that makes input valuable is its comprehensibility (Chapelle, 1997). One way to make input comprehensible is modification through simplification, elaboration, added redundancy, or sequencing (Chaudron, 1988; Larsen-Freeman & Long, 1991).

The input presented by ChatGPT combines all these factors. Its input is interactive and comprehensible and can be modified by the power of a giant database and artificial intelligence. In the field of vocabulary learning, Alsadoon (2021) designed a study based on a storytelling chatterbot. The participants were Saudi ELF learners who had the chance to practice with an interactive chatterbot equipped with four tools to assist vocabulary learning: a dictionary, images, an L1 translation tool, and a concordancer. The results revealed that the dictionary was the most preferred and effective tool used in learning vocabulary.

Kim (2018) conducted a study to investigate how chatbots influence Korean EFL students' vocabulary learning. The sample included 47 college students, and the study lasted eight weeks. The results clearly showed that the vocabulary skills of the students improved due to their engagement with the chatbot. The study also showed the positive attitudes of the students toward the experiment and their high levels of motivation, interest, and confidence in learning English.

Qasem et al. (2023) examined how chatbots affect the vocabulary acquisition of learners of English for special purposes (ESP) at the University of Bisha. The findings indicated that chatbots clearly enhanced the learning of ESP vocabulary, as the learners in the experimental group performed better than their counterparts in the control group. In addition, the chatbots offered learners interesting environments and fruitful interactions, which helped them advance their L2 lexical competence.

All these studies have explored chatbots other than ChatGPT. The dominant feature of ChatGPT is its reliance on artificial intelligence technologies. The quality of ChatGPT's content is very close to natural human language. Since this innovation is very recent, very few studies have addressed ChatGPT in correlation with vocabulary.

However, Ehara (2023) designed software based on ChatGPT to provide a personalized vocabulary acquisition experience for English language learners. The software provided a test for learners at the beginning to identify words that were new to them. The software then gave the learners the choice to select a topic according to their own interests. The next step was to produce texts around their interests that highlighted the learners' new words to facilitate their acquisition. This study, and similar ones, have provided personalized, adaptive, and efficient approaches to improving English proficiency.

A study by Phuong (2024) explores learners' behavior, attitudes and perceptions of the use of ChatGPT in English Language learning. The findings reveal that learners do recognize ChatGPT efficacy for vocabulary acquisition, grammar checking, translation and paraphrasing. However, the learners express their constant need for teachers' instructions and physical

classes.

3. METHODOLOGY

In this quasi-experimental study, the objective is to explore the impact of using a ChatGPT-based application on vocabulary learning. To achieve this aim, quantitative research methods will be used. Quantitative research uses statistical or numerous data to systematically investigate social phenomena (Watson, 2015). The phenomena under investigation in quantitative research must be measured. This study will use two different measures as tools for investigation. The first is quantitative analysis of the data from the pre-and post-tests targeting the vocabulary learned by using ChatGPT. The second is a quantitative analysis of data from the questionnaire to capture learners' attitudes toward the use of ChatGPT in their learning process.

3.1. Participants

The participants will be female second-year public high school students in Qassim, Saudi Arabia. The total number of students will be approximately 60, with an age range between 16–17 years. Choosing students at this age is because, according to UNESCO's guidance in using AI in education and research, the age of users of applications based on artificial intelligence should be no less than 16 years old. In addition, the students selected will be required to have experience with technology so that they can use the ChatGPT-based application used in this study.

3.2.Data Collection

The data collected in this study will be gathered using three main tools:

1- Pre-test and post-test (Appendix 1) targeting a list of vocabulary prepared in advance, including the most important vocabulary from the students' textbook (Appendix 2). The test consists of 54 multiple choice questions. Each question targets one word from the vocabulary list and aims to examine learners' knowledge about the words.

2- An application called "Learn With AI" based on ChatGPT where students interact with in order to be exposed to the targeted list of vocabulary. The app is developed by the second author using an application development language called Flutter. The application uses email authentication so that each student's data and actual usage of the application remains private can be seen solely by the student and the teacher. A list of the target vocabulary is preloaded in the application. When students log in to their account (Figure 1), they have access to the list of words and to the different modes (Meaning, Sentences, Story, and Practice). The Meaning mode gives the students the meaning of the target word and explain it in simple English and gives an Arabic translation of the word. The Sentences mode puts the target word in sentences so that students can see how the word can be put into actual use. The Story mode gives a short story in which the word is used while the Practice mode asks the students multiple choice questions to check their understanding of the target word and gives them relevant feedback. In order to configure the way ChatGPT is used to help students learn the target vocabulary the following prompts are embedded in in the application for the four modes used in the application. For the first mode, Meaning mode, the prompt is as follows "*Translate into Arabic, and explain in simple English the meaning of the following word*." The prompt for the second mode. Sentences Mode, is as follows "*Put the following word in 4 different sentences in simple English*." The Story mode is

triggered by the prompt "*Write a very short story, less than 20 lines in very simple English where you must use the following word*." Lastly, the prompt for the Practice mode is "*ask me 10 simple multiple-choice questions that involve the following word, you ask me to answer each question, and you evaluate my answer. You should ask me one question at a time. The word is*."

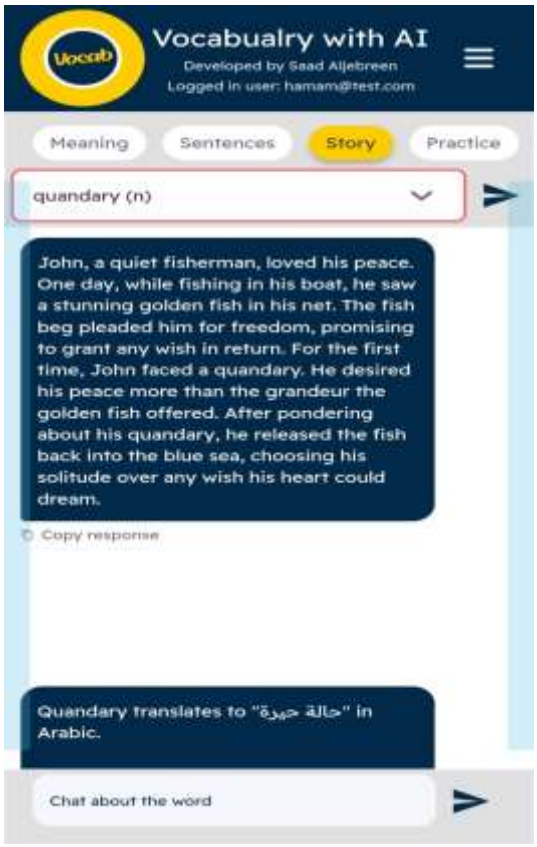

Figure 1. Application interface

3- A follow-up questionnaire adapted and modified from Ali, et al. (2012) will be distributed to the learners to examine their attitudes toward ChatGPT. The changes I have made is regarding the tools used in the original study. The questionnaire includes 15 statements. The Arabic version of the questionnaire will be handed to the learners. With regard to asking the learners about their attitudes about the whole experience, I believe it is better to be in their mother language since they can elaborate without difficulty. This questionnaire is provided in Appendix 3.

3.3.Procedures

First, a consent form will be completed by the students and their parents to confirm their willingness to participate in the study and to ensure that I have the parents' permission to use an artificial intelligence-based application. The students will then be divided into two groups: an experimental group and a control group. The students in both groups will take a pre-test to examine their familiarity with the targeted vocabulary. After that, the experimental group will use the ChatGPT-based application for eight weeks.

An interactive ChatGPT-linked application was developed specifically for this study. The targeted 54 words of the study are embedded within the application. The application will present the targeted vocabulary in various contexts, based on the learners' chosen modes. The application allows the students to chat with it using various modes (*meaning, sentences, story, practice, and chat*). The first mode is *meaning,* in which learners simply ask for clarification of one of the words in the vocabulary list. The second mode is *sentences,* in which learners are provided with examples of short contexts that use the words they are learning. The third mode is *story,* in which the targeted words in short stories are presented. The fourth mode is *practice,* in which simple quizzes of questions related to the targeted words are provided. The final mode is *chat,* which offers learners the opportunity to chat freely with ChatGPT. The rationale for using these modes is to guide the interaction towards contexts where the targeted words are used in various linguistic aspects.

The control group, on the other hand, did not have access to the application. Since the targeted vocabulary is part of the textbook they are studying, they would come across and learn the same vocabulary but through traditional methods. They use traditional pen and paper methods. The paper includes the exact same list of vocabulary integrated into the app. Each vocabulary has an Arabic translation beside simple English definition derived from the ChatGPT based application. Hence, learners in control group have access to some material that exist in the app found in meaning mode except the fact that unlike the app they are written in a paper form and had a noninteractive nature.

During the experimental period both experimental and control groups are in touch with the researcher through Telegram application. The researcher sends a reminder of a few words from the vocabulary list every 3-4 days. The researcher uses some encouraging phrases frequently. Students in experimental group are able to contact the researcher with technical problems they have faced during the experiment.

Next, the students in both groups will take a post-test exam to measure their improvement in their familiarity with the targeted vocabulary. Finally, the students will complete a questionnaire to explore their perceptions of the use of the ChatGPT-based application and the entire learning experience. The questionnaire is written in Arabic, which is learners' native language to make sure that they are fully understand and truly express their perception towards the application.

3.4. Data Analysis

The data obtained was analyzed using ANOVA to determine any significant influence of the approach using ChatGPT on their vocabulary learning. Analysis of variance (ANOVA) is a way to analyze data derived from experiments and is the most efficient parametric method available (Armstrong et al., 2002). It is widely used as a statistical technique in all kinds of fields. According to Kaufmann and Schering (2007), this technique depends on separating the variations that are observed in the data into individual factors, including random frequent occurrences. This strategy helps determine how factors (variants) influence the outcome of the experiment.

4. RESULTS AND DISCUSSION

The study seeks to show whether the use of a ChatGPT-based application can lead to improvement in EFL learners' vocabulary learning. The results demonstrated a significant

improvement in the students' performance in the experimental group using the ChatGPT-based application compared to the control group which was taught using traditional teaching methods. It is worth noting that both groups showed improvement after the treatment comparing the pretest and the posttest results. However, the experimental group showed greater improvement as shown by the quantitative results in the following table.

Code name	Pre-test score	Post-test score	Amount of improvement
SE01	1	28	27
SE02	5	11	6
SE03	6	22	16
SE04	3	14	11
SE05	28	36	8
SE06	2	36	34
SE07	3	10	7
SE08	10	14	4
SE09	41	46	5
SE10	6	29	23
SE11	5	12	7
SE12	10	14	4
SE13	6	10	4
SE14	39	50	11
SE15	5	14	9
SE16	3	11	8
SE17	10	19	9
SE18	38	46	14
SE19	22	32	10
SE20	7	34	27
SE21	7	18	11
SE22	50	54	4
SE23	12	21	9
SE24	15	39	24
SE25	5	14	9
SE26	4	21	17
SE27	6	17	11

Table 1. Experimental group results

As seen in the table above the scores ranged from 4 to 34 points. The average is 12.2 points.

As mentioned earlier, the control group relied on traditional methods to learn the target vocabulary. The following table shows that the control group performance scores were relatively lower than the scores of the experimental group.

Code name	Pre-test score	Post-test score	Amount of improvement
SC01	11	12	1
SC02	1	4	3
SC03	9	16	7
SC04	30	37	7
SC05	3	11	8
SC06	8	12	4
SC07	12	13	1
SC08	8	22	14
SC09	9	13	4
SC10	15	12	3
SC11	5	10	5
SC12	5	7	2
SC13	7	42	35
SC14	1	1	0
SC15	12	17	5
SC16	4	18	14
SC17	5	6	1
SC18	4	12	8
SC19	6	14	8
SC20	7	23	16
SC21	4	19	15
SC22	10	13	3
SC23	6	16	10
SC24	6	6	0
SC25	14	15	1
SC26	15	17	2
SC27	6	32	26
SC28	7	16	9
SC29	11	15	4
SC30	7	13	6

Table 2. Control group results.

The table above shows that the control group scores ranged from -3 to 14 points. The average is 7.4 points.

4.1.Statistical Analysis of the data

An attempt was made to check whether the differences between the two groups are statistically significant. To achieve this a t-test was conducted and the results of the test are shown in the following table:

Test	t-value	p-value	Statistical Significance
Pre-test Scores	-1.638	0.111	Not Significant
Post-test Scores	-3.076	0.0036	Significant
Difference Scores	-2.262	0.0278	Significant

As shown in the table above, the pretest scores show no statistically significant differences exist between the two groups. This indicates that the two groups were at a similar level before starting the experiment. However, the posttest scores and the difference scores show statistically significant differences between the two groups. The experimental group showed better performance than the control group ($p < 0.05$).

The results indicate that the application enabled the students to engage more with the vocabulary they seek to learn. This is most probably due to its interactive nature which allows the students to use different modes. This allows students to spend time learning each word and to get exposed to the word in various contexts. The application also allows students to ask questions and get real time feedback on the words they learn. The use of the application to learn

vocabulary allows students to practice learning repeatedly and could potentially lead to greater retention. Since the application relies on ChatGPT this ensures that the more students practice learning vocabulary the more they will be exposed to new content and different contexts of word use each time they seek to learn a word. This aspect of interactivity in learning vocabulary via the application aligns with the interactionist theory of second language acquisition which highlights the importance of interaction, negotiation of meaning and feedback in language acquisition (Long, 1996).

Another aspect that shows the advantage that ChatGPT-based systems bring to the language learning scene is feedback. The feedback that the learners receive in the application is dynamic and will help them finetune and cement their learning of vocabulary. As the same time the feedback will help learners find gaps and weaknesses in their learning and fix them in a personalized manner. Cao & Zhong (2023) have shown that ChatGPT can help EFL/ESL learners in many respects. One is that ChatGPT offers immediate and personalized feedback. This feature is very significant in second language learning contexts as students need feedback and correction of the language items they learn. Second, ChatGPT provides unlimited and ample feedback. Students can keep practicing and refining their responses and the sentences they produce. Third, learners are exposed to authentic language usage when they interact with ChatGPT which improves their proficiency.

The study also seeks to explore the students' attitudes toward using the ChatGPT application, specifically for learning EFL vocabulary. Data gleaned from the questionnaire (Table3 below) show that students' attitudes were largely positive. Most of them expressed their satisfaction about the various aspects of using the application, engagement, ease of use, and effectiveness. The application makes it possible for students to practice and learn as much as they can without the confinements of the classroom setting. Furthermore, students indicated that the application allowed them to learn and experiment and engage actively in their learning without the anxiety that might be there in classroom settings. In addition, students noted that the app provides various interactive learning modes which creates the necessary conditions for the different learning styles that students might have. This increased students' overall satisfaction with the application.

Table 3. Percentages of the questionnaire results

Item	Strongly agree %	Agree %	Somewhat true %	Disagree %	Strongly disagree %
1. I was able to enrich my vocabulary knowledge using ChatGPT.	60.87	26.09	8.70	4.35	0.00
2. I was able to increase my skills in learning vocabulary using ChatGPT.	52.17	30.43	17.39	0.00	0.00
3. I was able to improve my vocabulary using ChatGPT.	60.87	26.09	8.70	4.35	0.00
4. I was able to follow or keep up with the learning of vocabulary using ChatGPT.	43.48	34.78	13.04	8.70	0.00
5. I was able to make the best use of ChatGPT in learning vocabulary.	47.83	39.13	13.04	0.00	0.00
6. I was able to increase my knowledge of the words I learned using ChatGPT.	43.48	39.13	13.04	4.35	0.00
7. I had a good opportunity to learn vocabulary using ChatGPT.	56.52	21.74	13.04	4.35	4.35
8. I was motivated to use this method in learning vocabulary after I was introduced to ChatGPT.	47.83	26.09	21.74	4.35	0.00
9. I noticed that my understanding of vocabulary learning changed after exposure to ChatGPT.	43.48	30.43	26.09	0.00	0.00
10. I was able to easily memorize the meaning of words I learned using ChatGPT.	47.83	26.09	21.74	4.35	0.00
11. I was able to easily recall the meaning of words I learned using ChatGPT.	30.43	43.48	21.74	4.35	0.00
12. I enjoyed learning vocabulary while using ChatGPT.	52.17	34.78	13.04	0.00	0.00
13. I found it interesting to use ChatGPT to learn vocabulary, which motivates me to use it in the future.	56.52	34.78	4.35	4.35	0.00
14. I found ChatGPT suitable for my vocabulary learning.	47.83	30.43	17.39	0.00	4.35
15. I felt comfortable using ChatGPT in learning vocabulary, as it is not judgmental.	60.87	26.09	4.35	8.70	0.00
16. I prefer the "meaning" mode the most.	39.13	47.83	13.04	0.00	0.00
17. I prefer the "sentences" mode the most.	43.48	47.83	8.70	0.00	0.00
18. I prefer the "story" mode the most.	39.13	30.43	26.09	0.00	4.35
19. I prefer the "practice" mode the most.	52.17	39.13	8.70	0.00	0.00
20. I prefer the "chat" mode the most.	34.78	34.78	30.43	0.00	0.00

The learners showed very positive attitudes towards learning vocabulary via the application. They enjoyed learning in this manner and found it motivating. The majority of learners believe that the application gave them a good opportunity to learn vocabulary and improve their word knowledge. Furthermore, the learners reported that learning words using the application was interesting and comfortable for them. It created the right conditions for them to learn in a non-judgmental environment.

These findings align with studies by Solak (2024) and Ali et al. (2023) which indicated that AI tools enhance motivation and engagement since they provide interactive, personalized, and flexible learning experiences for students. Additionally, the results corroborate a similar result by Lo et al. (2024) and Qu & Wu (2024) who indicated that students appreciated flexibility, motivational benefits of using AI tools for language learning and showed positive learning outcomes and better engagement. The results are also aligned with studies by Phuong, (2024); Cai et al. (2023); Ajlouni et al. (2023); Ali et al. (2023); Tran et al. (2024) which showed the positive attitudes that learners have.

5. CONCLUSION

The study aimed at exploring the impact of using a ChatGPT-based application on EFL students' vocabulary learning. In addition, the purpose was to identify students' attitudes toward using this technology. The results have shown that using the application led to better results in the posttest scores. Using the application students had ample real time feedback on the vocabulary items they learn. This is a great challenge for a classroom teacher to give detailed and repeated feedback to a class of twenty students at the same time. The feedback is also personalized and tailored to each student. Using the technology discussed here would allow students to practice learning words repeatedly and could potentially lead to greater retention. Furthermore, the study showed that students held positive attitudes towards learning vocabulary using the application. Finally, since the application relies on ChatGPT this entails that as students practice learning vocabulary they will be exposed to new content and multiple contexts of word use each time they practice learning a word. This makes their learning experience richer and increases word retention.

This study, however, has some limitations that provide extra insights for future research. The sample of this study has a small size, and it is restricted to female gender only. Further research might aim to study larger and more diverse samples. Moreover, this study is targeting one language aspect which is vocabulary acquisition. More studies are needed to cover other language aspects including reading, writing, listening, speaking and grammar. Additionally, the most distinct feature of technology and AI based applications is that there are always ways of developing and improving. Utilizing features of pronunciation for instance can be more effective for example. Other technical features such as counting the time spent by each learner on the application and connecting it to their scores and performance can lead to more precise findings.

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