

JOURNAL OF RESEARCH STUDIES IN ENGLISH LANGUAGE TEACHING AND LEARNING



This article is published by
Pierre Online Publications Ltd,
a UK publishing house



ISSN (online): 2977-0394

KEYWORDS

*Artificial intelligence,
ChatGPT, EFL students,
synonym teaching,
vocabulary acquisition*

To cite this article in APA 7th style:

Jia Min, C. (2024). The use of AI and ChatGPT in teaching synonyms to EFL students. *Research Studies in English Language Teaching and Learning*, 2(4), 187–207.
<https://doi.org/10.62583/rseltl.v2i4.53>

For more citation styles, please visit: <https://rseltl.pierreonline.uk/>

The use of AI and ChatGPT in teaching synonyms to EFL students

Chen Jia Min  ¹

¹*Beijing Foreign Studies University (BFSU) in Beijing, China*

Abstract

The research is carried out to investigate the efficiency of artificial intelligence, particularly ChatGPT, in teaching synonyms for EFL students. In this sense, the study included 90 students divided into two groups, one is the experimental and the other is a control group. Exercises based on ChatGPT were applied for the former, whereas traditional methods were applied for the latter. In this study, it has been reported that the experimental group has shown significant improvement in vocabulary acquisition. Also, the instant feedback and personalised learning experiences with ChatGPT increased student engagement and motivation. It is a demonstration that the integration of AI tools into language education could facilitate effective and interactive learning opportunities as opposed to conventional approaches. However, combining the two—using AI along with human instruction in a balanced way—is recommended for obtaining maximal educational outcomes and curbing the negative ethical concerns arising from the use of AI in education. This study also provides more support for the use of AI in improving language learning and suggests that additional research can be conducted on this topic, such as integrating AI in an educational environment.



Under Creative Commons Licence:
Atribución 4.0 Internacional (CC BY 4.0)

Introduction

The infiltration of artificial intelligence into different educational settings, including language learning, has seen a lot of mass attention over the past few years. Artificial Intelligence systems showcase human-like intelligence that enables tasks like image perception, decision-making, language translation, and speech recognition. These systems underlie advanced algorithms and statistical models to perform those tasks that have been traditionally believed to be inherently human and cognitive. The tendency of a number of scholars is more towards exploring the potential for artificial intelligence (AI) in language learning through enhancing student proficiency than some ethical considerations held under question (Zheng, Li, & Liu, 2020; Drukker et al., 2020; Russell & Norvig, 2010). The application of AI in education started as far back as the 1960s and has gradually shifted paradigms through the application of intelligent tutoring systems, adaptive learning, and educational games. AI tools provide feedback for writing and speaking skills. In a broad perspective, it is applied in academia (Lee, 2023; Mohamed & Shabaan, 2021; Wang et al., 2023). ChatGPT came to light after its release by OpenAI on text generation of numerous varieties and has also sparked debate in academic literature (Aydin & Karaarslan, 2022; O'Connor, 2022; Van Dis et al., 2023). The history of AI applied to language learning includes early applications such as the 1966 ELIZA program by Joseph Weizenbaum. It showed how AI could be used within very simple conversational contexts. Today, much more sophisticated AI applications in the market are delivering personalised feedback and support while learning a language (Colak et al., 2008). This series of progressions clearly shows that AI has played an effective catalytic role in developing innovative tools of language learning and is very likely to evolve further.

The push for the integration of AI in teaching English as foreign language (EFL) in China also associates with the quick revolution in the technological domain and the need for augmenting language learning. The conventional means and methods via classroom and textbooks are being overtaken by AI-powered tools to give relatively interactive and effective learning experiences (Zheng, Li & Liu, 2020; Yu & Hwang, 2021). The Chinese government supports the integration of AI within broader efforts of educational modernisation, which dramatically increases the use of AI in classrooms. The integration of AI into language education allows for improved accessibility, affordability, and effectiveness. The AI-driven tools enable personalised learning that leads to the acquisition of improved vocabulary and grammar. In comparison to the traditional methods, AI tools can offer constant availability, real-time responses, and adaptability to individual learning styles, making them particularly effective for language acquisition (Huang et al., 2023; Kuleto et al., 2021). Nevertheless, traditional methods are very important when it comes to the development of conversational skills and cultural understanding. The collaborative and social interactions achieved through human educators' participation are important in realising comprehensive

language development (Alharbi, 2023; Zhao, 2022). Accordingly, a balanced approach to the integration of AI tools with conventional approaches is imperative for the maximum realisation of benefits among students.

Literature Review

An artificial intelligence system is a computer system embedded with human-like intelligence that can perform processes such as image perception, decision making, language translation, and speech recognition (Radford et al., 2019; Russell & Norvig, 2010). AI could also be defined as a branch of computer science developed to create machines capable of executing actions without being controlled by a human being. This involves using algorithms and statistical models to enable machines to accomplish tasks that, when done by humans, are considered within the faculties of human intelligence (Yu & Hwang, 2021). In recent years, the use of AI in language learning has attracted significant attention from researchers exploring its potential to enhance student language proficiency (Zheng, Li, & Liu, 2020). However, ethical issues with AI-based language learning technology also have to be considered (Drukker et al., 2020; Russell & Norvig, 2010). AI has been influencing education from the 1960s: intelligent tutoring systems, adaptive learning, educational games. AI is applied in enhancing feedback for writing and speaking skills: intelligent technology in language learning is implemented widely at schools and universities. Where AI is still evolving, the tools of today will be more sophisticated as time passes, and such changes are a must for modern education (Lee, 2023; Mohamed & Shabaan, 2021; Wang et al., 2023). OpenAI launched ChatGPT in November 2022, and after that, it gained a lot of popularity in generating written content such as stories, poems, or essays. In spite of these limitations, ChatGPT has drawn the attention of academicians, thereby even leading to the set-up of task teams in institutions and holding meetings on the implications of ChatGPT use in institutions (Aydin & Karaarslan, 2022; O'Connor, 2022; Van Dis et al., 2023). The use of AI in language learning is not new. In 1966, Joseph Weizenbaum developed a computer program called ELIZA, with which the user could engage in simple conversations with a psychotherapist. Although very basic, ELIZA proved there could be potential within AI for language learning. A series of AI-based applications for language learning—like personalisation and tutoring from virtual language teachers—grew in ways that allowed for interactivity with the student to make comments and give other feedback and support (Colak et al., 2008). No surprise that AI is seen as the instigator for far more exciting and innovative development in the field of language learning and likely will evolve further in this more effective and innovative form.

In China, the use of AI in teaching English as a Foreign Language (EFL) has gained significant attention in recent years due to rapid technological advancements and the growing demand for improved language education. Traditionally, classroom lectures and textbook-based learning were the norm in language education. However, the advent of AI and the development of AI-powered

language learning tools have led to a shift towards integrating technology in language teaching (Zheng, Li, & Liu, 2020; Yu & Hwang, 2021). The Chinese government has been actively promoting the integration of AI in education as part of its broader push to modernise the educational system and improve the quality of language instruction. This has resulted in a notable increase in the adoption of AI tools in classrooms, aiming to enhance the learning experience and outcomes for students.

Recent years have seen a great rise in using technology towards education in language. Now, with the advancements of AI and other technologies, tools that can facilitate language learning are very accessible, affordable, and effective. Technology can play an important role in facilitating learning and enhancing the experience of the learner. The researchers also pointed out that the implementation of AI-based learning tools could lead to an enhancement in language learning results on the basis of students' personal experience, improved motivation and engagement of the learners, and effective acquisition of new vocabulary and grammatical skills in class (Warschauer & Healey, 1998; Warschauer, 2003; Hwang et al., 2012). At present, language education is becoming reliant on technology, and with many benefits accruing from the use of AI-based language learning. Technology needs to be embedded in the best practices, mindfully and strategically considering other traditional practices. In comparison to traditional language teaching methods, research in AI-powered language learning tools has been the focus for over a decade. These advanced approaches to utilising AI in language teaching are catering to the spiraling demand to experience more personalised and efficient lessons. Compared to traditional language teaching methods, AI-powered tools have been found to facilitate learning as they provide 24/7 availability, real-time feedback, and individual adaptation regarding users' learning styles. Previous research supports the effectiveness of AI-supported language learning tools over traditional teaching methods. Language learning apps are greatly personalised and interactive, improved pronunciation and speaking fluency. (Jia et al., 2022; Ruan et al., 2021). Nonetheless, the more traditional methods of language teaching still offer an ineliminable part in creating personal, human-centered approaches toward learning and building the conversational skills and cultural understanding of a language. Collaboration and social interaction among students are also critical for language development (Alharbi, 2023; Zhao, 2022). As the use of chatbots and virtual tutors grows to improve language proficiency, there is even more need to balance it with conventional methods. A number of ethical considerations come into play in the implementation of AI: privacy, fairness, transparency, accountability, and human controllability. Robust privacy policies and informed user consent go a long way to mitigate such privacy concerns. In view of the advancement of technology, the research is underway regarding the effect of AI-powered language learning tools on the skills of using the language (Ali, 2020; Ilkka, 2018; Ruan et al., 2021; Tawil, 2019).

Language Learning, an important ethical component of AI and language learning would be fairness. In this case, the algorithms should consider biases, discrimination, and other errors. On the other hand, transparency in the design of AI-driven language learning tools infers that the algorithms and data usage are open for inspection. Finally, the other important ethical concern is accountability in which the companies will be open about who they hold accountable for tool performance and their outcomes. Note that AI tools should supplement and augment human learning but not replace human teachers, with respect for human dignity, autonomy, and privacy guiding their use in language learning (Fletcher et al., 2021; Tawil, 2019). In the last years, the use of AI tools in language learning has been a central area of research attention, whereby researchers and practitioners have explored the advantages and disadvantages of incorporating AI tools within language teaching. Personalised learning could also be the greatest advantage of AI in learning English, as AI language learning tools can be designed to give a customised experience according to the learning style, pace, and level of language proficiency of each student. It has been found to enhance the levels of students' motivation and engagement by (Alzahrani, 2022; Bhbosale et al., 2020; Xia et al., 2023).

AI tools provide instant feedback on language use, pronunciation mistakes, and a chance to quickly correct them for better language skills through a process of continuous learning. The AI language learning tools that can be accessed by students using digital devices and the internet empower students by offering an opportunity to learn and practice their language skills anywhere at any given time. Nevertheless, there are also some downsides of applying AI to language learning—precisely this feature of missing human interaction. AI tools can never be replacements for the real, emotional, and cultural links that have to be developed inside the framework of conventional language classes. Thus, it leads to learners disengaging from the language context and culture. (Ebadi & Amini, 2022; Iliashenko et al., 2019). This raises further concerns that such tools might enhance rather than reduce social biases and discrimination in language use as AI language learning tools (Wei & Niemi, 2023). In many cases, the AI tools are often dependent on pre-programmed datasets and algorithms which may deny students the opportunity to experience the whole range of language use and diversity witnessed in real-life settings (Alam, 2022; Kuleto et al., 2021). These should be taken into account when educators and researchers decide to use AI tools in language instruction. Studies show that AI-assisted language tools can help in the process of learning a new language for language acquisition (Chang et al., 2022; Hang et al., 2022). For example, this can be demonstrated to show that an artificial language tutor helps Korean English learners improve their writing: 'The student who used the AI tutor demonstrated gains in grammatical accuracy and writing fluency' (Chang et al., 2022 p. 9). Another study that compared AI-powered language learning tools with traditional methods of language learning showed that the students who used AI-powered tools performed better in their language skills as compared to students using the traditional tools for language learning. Possibly, this demonstrates the ability to

integrate AI-driven language-learning tools in language education because they provide for more efficient and effective ways of acquiring a language for learners. According to Holmes and Tuomi (2022), AI in language learning tools, such as chatbots, powerfully promoted the process through immediately available feedback and personalisation of experiences. It was also shown that the new tools for learning had a positive impact on motivation and brought a significant increase in the involvement of learners in the process of learning a new language. Furthermore, effectiveness has been noted in improved grammar and vocabulary skills with an increased upsurge in AI-driven language tools in the foreign language of Arabic, such as that recently studied by Al-Abdullatif and Alsubaie (2022) in their academic inquiry. Found the tools to significantly improve grammar and vocabulary skill levels in Arabic, while the learning itself became more personalised and thus easier for learners to understand and retain new language concepts.

One study reported that faculty considered chatbots as useful tools for fostering students' language competencies and active learning. Another paper reported that faculty believed chatbots would provide personalised feedback to students to develop their writing skills. Hew et al. (2023) supported this when they said that chatbots were convenient, easily accessible tools through which faculty could offer immediate feedback to their students; thus, they reduced workload and time constraints. However, some concerns were raised about how effective chatbots were in teaching English. For example, many faculty members worried about the accuracy of chatbot-generated language, whether it could pick up on subtleties in human language use (Sun & Hoelscher, 2023; Tlili et al., 2023). AI-powered language learning tools demonstrate very promising results related to language acquisition, writing skills, grammatical accuracy, and fluency; in most cases, they even surpass traditional teaching methods. Chatbots are endowed with personalisation experiences and on-the-go feedback, proving to be more motivational and engaging in learning the language. They helped students learn new vocabulary and further refine grammatical and vocabulary competence. But faculties still have a concern about the accuracy in the generation of language and the power of chatbots in understanding human language nuances. However, faculties consider chatbots to be effective in language skill development, fostering active learning, and saving time. However, what seems missing is an in-depth analysis and recommendations on possible benefits, drawbacks, or integration of ChatGPT with other teaching practices. Filling this gap might directly contribute to the development of effective tool and pedagogical practice for language learning.

Research questions

Q1: To what extent does the use of ChatGPT-based exercises improve the vocabulary acquisition of synonyms among EFL students compared to traditional teaching methods?

Q2: What is the difference in pre- and post-test scores for synonym vocabulary acquisition between EFL students who use ChatGPT-based exercises and those who follow traditional teaching methods?

Methodology

Participants include 90 EFL students in three proficiency levels, randomly assigned to control and experimental groups. ChatGPT-based synonym learning exercises used for the experimental group, and the traditional way of treatment in class will be followed for the control group. Pre- and posttests administered to both groups in order to measure vocabulary gains. The differences among test scores measured for significance using statistical methods like paired t-tests.

Participants

The participants were selected from students in the bachelor's programme course at Beijing Foreign Studies University (BFSU), taking the EFL course, located in Beijing, China. With its comprehensive and outstanding languages programmes and faculty, BFSU provides an apt environment for the present study. A total of 90 female Chinese participants aged between 17 to 19 years were used in this research. The reason these participants were chosen was because they were currently taking courses in English. It was reasoned that this would provide a more homogenous group with respect to those participating in EFL learning. Participants were invited through direct invitation as well as posting several advertisements on the university's online sites and physical notice boards. In order to participate, participants must have been a current EFL undergraduate student who has completed, at a minimum, one semester. Exclusion criteria were for students who had left their studies on a leave of absence and those who had not yet completed their first semester in the university. The purpose of the selection was to guarantee that the cohort, in its diversity of backgrounds and experiences, represented an all-round view of applying AI in English language teaching and learning. The researcher is a student in the PhD program at BFSU, majoring in English language education. All participants gave their informed consent before participating in the study and had their anonymity and confidentiality safeguarded throughout the research. Ethical considerations for this study were those prescribed by the institutional review board of BFSU.

Materials

The materials in the present research are designed to test the effectiveness of ChatGPT in teaching EFL students the synonyms. The main tool to be used for the experimental group is the ChatGPT platform—one of the state-of-the-art models for the OpenAI natural language processing series. This model was utilised for the creation of interactive exercises, for providing context-rich examples of synonyms, and for engaging students in dialogues for vocabulary acquisition. For the

control group, they received traditional teaching that entailed workshopped printed worksheets, exercises in the textbook, and teacher-based activities on synonym learning. The latter items were drawn from typical EFL textbooks routinely used by teachers in the university. To assess the vocabulary gains, pre- and post-tests were constructed. These consist of question items in the form of multiple choices, matching exercises, and sentence completion that assessed students' knowing and using synonyms. The tests were reviewed by EFL experts to make sure that both validity and reliability were taken care of. In addition, the participants were asked to fill out questionnaires that aimed to capture their attitudes and experiences with the learning methods used. The questions were drawn with the assistance of a Likert scale so that open-ended questions could gather as much information regarding the students' perceptions as possible.

The data collected were analysed using statistical software (SPSS). This program allowed for the entry, recording, and calculation of quantitative data derived from the pre- and post-tests and questionnaires. The experimental study took place in the classrooms within a controlled educational setting in BFSU. The rooms were equipped with the necessary technological means—computers and internet supply—both for the teachers and students for the use of ChatGPT. In addition, traditional classrooms were also supplied with whiteboards, projector, and print materials to enable activities in the control group. To ensure such a full, in-depth investigation into the effectiveness of ChatGPT in teaching synonyms to EFL students, this study applied these materials while making sure it does not compare unfairly with conventional teaching.

Procedure

This research was conducted over eight weeks at Beijing Foreign Studies University and involved 90 participants of a homogeneous group of female EFL students with ages ranging from 17 to 19 years old. The students were randomly divided into an experimental group and a control group with 45 students in each group. Preceding the study, the students were given a pre-test with synonyms to test their vocabulary. There was a variety of different kinds of questions in the pre-test, which consisted of multiple-choice, matching exercises, and sentence completion tasks. The experimental group was given the same pre-test, after which they used ChatGPT for their vocabulary lessons, and the control group did not experience any change in the prescribed teaching method.

The number of times the students in the experimental group had the program was two per week, with a class time of 90 minutes. It was possible to confirm that the kind of exercises developed by ChatGPT, including context-rich examples along with dialogues devoted mainly to synonym learning, was quite interactive. These students had access to computers that were connected to the internet, and therefore they could use ChatGPT, which made the AI tool part of their learning

environment. The control group in this case was conducted traditionally - twice a week for 90 minutes each week. These classes included face-to-face time with the teacher, printed-out handouts, exercises from the textbook to learn synonyms, and a classical way of memorising and using synonyms out of context.

Throughout the study, both experimental and control groups were provided with other resources that included textbooks and online materials. Instructors facilitated the implementation of both methods, which were maintained throughout the study. The eight weeks concluded by the administration of the post-test, which was identical in format to the pre-test, to determine their knowledge and use of synonyms. In addition to that, questionnaires were used to capture the attitudes and the experiences of the participants of the employed learning methodologies.

This data has been collected as the results of pre- and post-tests and the answers to questionnaires, which were then statistically processed by software (SPSS). The scores of the pre- and post-test of each group are compared between each other through a paired t-test; also, the scores of the experimental and control groups are compared with an independent t-test. Results were analysed in order to determine whether ChatGPT helped significantly enhance vocabulary acquisition compared to traditional teaching. Such a study would have regular teaching schedules, and normal resources for both groups of the study in order to find out the impact of AI-driven vocabulary instruction on EFL students comprehensively and fairly.

Ethical Considerations

The present study was characterised by a high degree of adherence to ethical considerations safeguarding the welfare and dignity of all the participants. Before research was conducted, approval to carry out the study was obtained from the IRB at Beijing Foreign Studies University. This approval ensured that the design, procedure, and materials used in the present study adhered to standard principles considered important for an activity involving human participants. The study was explained to the participants and only included after they gave their informed consent. Information was given in detail about the purpose of the study, procedures, potential risk, benefits, and so on to the participants. They were informed that participation was voluntary and that they could withdraw from the study at any time without any penalty or loss of benefits otherwise entitled to them. In addition, parents provided consent for participants under 18 years of age.

To maintain confidentiality and anonymity, the names and other personal identification information were excluded; rather, all data were categorised based on the unique identification codes assigned. All information obtained, both scores from the tests and responses from the questionnaires, was safely stored and only available to the members of the research group. No identifying information was used within any report or publication produced from the study. This study also took the necessary steps to ensure that the intervention was not at a disadvantage to the

participants. The instruction to the experimental and control groups was of high quality, except with an alternative mode for each group. These AI and traditional teaching modes were designed to be fair to the educational value, so that neither group would get inferior treatment.

At the end of the study, a debriefing session was conducted with the participants. They received a summary of the research results and were allowed to ask questions or comment. The debriefing was done to appease the participant and inform them that their participation was very significant to them. Lastly, the potential of ethical issues in using artificial intelligence in education was not left unattended by the research team. The present study has been conducted mainly with the purpose of improving educational outcomes, understanding how AI influences learning, and, through this dual aim, guarding against an overreliance on technology to preserve the continued salience of human educators in the learning process. These ethical considerations were observed as the research maintained the highest standards of integrity and care toward the participants.

Results

Students using ChatGPT demonstrate a significant change in their understanding and usage of synonyms. Exercises using AI techniques have the power to enhance one's motivation and engagement, thus leading to better retention of vocabulary. Specific results are indicated by the statistical analyses of pre- and post-test scores, which directly reflect the effectiveness of ChatGPT in vocabulary acquisition.

Analysis of Within-Subjects Contrasts

The tests of within-subjects contrasts provide insight into the changes in vocabulary acquisition over time and the interaction between time and group membership. The results are summarised in Table 1.

Table 1

Tests of Within-Subjects Contrasts

Source	time	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
time	Linear	26.450	1	26.450	17.735	<.001	.168
time * Groups	Linear	16.806	1	16.806	11.268	.001	.114
Error(time)	Linear	131.244	88	1.491			

The main effect of time was significant, $F(1, 88) = 17.735, p < .001, \eta^2 = .168$. This indicates that there was a substantial change in vocabulary acquisition over the period of the study for both groups combined. The high F-value and significant p-value suggest that the improvement in vocabulary scores was not due to random variation but reflects a genuine effect of the intervention period. The interaction between time and groups was also significant, $F(1, 88) = 11.268, p = .001, \eta^2 = .114$. This significant interaction effect indicates that the change in vocabulary acquisition over time differed between the experimental and control groups. Specifically, the significant F-value implies that the experimental group, which used ChatGPT-based exercises, experienced a different trajectory of improvement compared to the control group, which followed traditional teaching methods. The error term for the linear effect of time had a sum of squares of 131.244 with 88 degrees of freedom, resulting in a mean square of 1.491. This indicates the variance that could not be explained by the within-subjects factors (time and the interaction between time and groups).

The significant main effect of time demonstrates that vocabulary acquisition improved over the study period for all students, indicating the effectiveness of both teaching methods to some extent. However, the significant interaction effect between time and groups highlights that the improvement was more pronounced for students who used ChatGPT for learning synonyms. This suggests that the AI-driven approach not only facilitated vocabulary acquisition but also did so more effectively than traditional methods. The partial eta squared values further illustrate the strength of these effects. A partial eta squared of .168 for the main effect of time indicates a large effect size, meaning that a substantial portion of the variance in vocabulary scores can be attributed to the passage of time and the interventions applied. Similarly, a partial eta squared of .114 for the interaction effect indicates a moderate effect size, underscoring the differential impact of the two teaching methods over time.

These results collectively support the hypothesis that integrating AI tools like ChatGPT into EFL education can significantly enhance vocabulary learning, providing a more effective and engaging approach compared to traditional methods as illustrated in Table 2.

Table 2

Tests of Within-Subjects Effects

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
time	Sphericity Assumed	26.450	1	26.450	17.735	<.001	.168

	Greenhouse-Geisser	26.450	1.000	26.450	17.735	<.001	.168	
	Huynh-Feldt	26.450	1.000	26.450	17.735	<.001	.168	
	Lower-bound	26.450	1.000	26.450	17.735	<.001	.168	e 197
time * Groups	Sphericity Assumed	16.806	1	16.806	11.268	.001	.114	
	Greenhouse-Geisser	16.806	1.000	16.806	11.268	.001	.114	
	Huynh-Feldt	16.806	1.000	16.806	11.268	.001	.114	
	Lower-bound	16.806	1.000	16.806	11.268	.001	.114	
Error(time)	Sphericity Assumed	131.244	88	1.491				
	Greenhouse-Geisser	131.244	88.000	1.491				
	Huynh-Feldt	131.244	88.000	1.491				
	Lower-bound	131.244	88.000	1.491				

Main Effect of Time

The main effect of time was significant under all assumed conditions (sphericity assumed, Greenhouse-Geisser, Huynh-Feldt, and lower-bound), $F(1, 88) = 17.735, p < .001, \eta^2 = .168$. This indicates that there was a substantial change in vocabulary acquisition over the period of the study for both groups combined. The consistency of the results across different assumptions confirms the robustness of the findings. The high F-value and significant p-value suggest that the improvement in vocabulary scores was not due to random variation but reflects a genuine effect of the intervention period. The interaction between time and groups was also significant under all assumed conditions, $F(1, 88) = 11.268, p = .001, \eta^2 = .114$. This significant interaction effect indicates that the change in vocabulary acquisition over time differed between the experimental and control groups. Specifically, the significant F-value implies that the experimental group, which used ChatGPT-based exercises, experienced a different trajectory of improvement compared to the control group, which followed traditional teaching methods. The error term for the linear effect

of time had a sum of squares of 131.244 with 88 degrees of freedom, resulting in a mean square of 1.491. This indicates the variance that could not be explained by the within-subjects factors (time and the interaction between time and groups).

The significant main effect of time demonstrates that vocabulary acquisition improved over the study period for all students, indicating the effectiveness of both teaching methods to some extent. However, the significant interaction effect between time and groups highlights that the improvement was more pronounced for students who used ChatGPT for learning synonyms. This suggests that the AI-driven approach not only facilitated vocabulary acquisition but also did so more effectively than traditional methods. The partial eta squared values further illustrate the strength of these effects. A partial eta squared of .168 for the main effect of time indicates a large effect size, meaning that a substantial portion of the variance in vocabulary scores can be attributed to the passage of time and the interventions applied. Similarly, a partial eta squared of .114 for the interaction effect indicates a moderate effect size, underscoring the differential impact of the two teaching methods over time.

Discussion

This study's findings underline a significant development in vocabulary gain for the experimental group exposed to ChatGPT for the learning of synonyms over the control group using traditional methods. These results are quite consistent with studies in the available literature, where AI-driven tools have been referred to as an approach toward improving language learning outcomes by providing tailor-made, interesting, and context-rich learning experiences (Zheng, Li, & Liu, 2020; Hwang et al., 2012). The ability of ChatGPT to offer personalised learning experiences is one of the key factors leading to the success of this research. The model adapts its responses based on the level of proficiency of the learner and their pace, bringing examples that are contextually relevant and, in many cases, interactive exercises. This usually increases student engagement and consequently their motivation toward language learning (Alzahrani, 2022; Bhbosale et al., 2020). The literature supports the observation that personalised learning experiences are critical in enhancing student motivation and engagement, which result in improved retention and understanding of new vocabulary items (Warschauer & Healey, 1998; Warschauer, 2003).

Another good thing with ChatGPT is that it can respond promptly to students' answers. Through immediate feedback, students are able to correct their mistakes quickly and therefore learn through immediate reinforcement (Fu et al., 2022). This approach is more effective compared with traditional methods of teaching, whereby most have delays in feedback due to the logistical challenges that classroom settings present. Timely feedback from AI tools keeps students on course through enough correction and guidance, thus ensuring an effective learning process.

ChatGPT's interactivity and capability to produce context-rich examples help to make student learning meaningful. Through the context of dialogues with the AI, students will explore synonyms and apply them in an appropriate manner. This perspective is deeply grounded within Vygotsky's social constructivist theory, as it is widely believed that learning is best realised through the socialisation of interaction and contextualisation. It might not be easy for students to learn a new word only through text, but they will feel comfortable learning through the social context and other interactions. This is further supported in the literature by the fact that language learning can greatly be improved by AI-driven tools that allow for interactive learning. As had been identified in the literature and found with AI-driven tools helping to facilitate interactive learning in language acquisition, it became evident.

One of the strengths of using AI tools like ChatGPT is their ability to cater to diverse learning needs. Traditional classroom settings often struggle to accommodate the varied proficiency levels and learning styles of students. In contrast, AI tools can adapt to each student's individual needs, providing differentiated instruction that helps all students achieve better outcomes (Kuleto et al., 2021; Huang et al., 2023). This adaptability likely contributed to the superior performance of the experimental group in this study, as each student could engage with the material at their own pace and according to their own learning preferences.

The traditional techniques used for teaching synonyms have much been through rote learning and may provide very little context for practice, which could be insufficient for real depth in learning. This study believes that by adding interaction and enhancing the context, exercises ChatGPT can make up for these constraints found in these methods, thereby allowing students to understand better and effectively make use of synonyms (Huang et al., 2023; Alharbi, 2023). This is further justified by the very high improvements in vocabulary acquisition recorded in the group with experiments compared to the control one.

The obtained results are of a promising nature, although there are some ethical concerns and challenges regarding using AI in education. Most important among them are the questions of privacy, data security issues, and potential algorithmic biases that might arise while the system is being set up and deployed in the process (Fletcher et al., 2021; Wei & Niemi, 2023). It is essential to ensure transparency in the operation of AI tools and accountability for their performance. Using informed consent of the user and strong privacy policies has been noted in the literature as effective ways to address privacy matters concerning AI tools.

According to Ebadi & Amini (2022), AI can never replace the role played by human educators in the provision of avenues for social interaction, cultural understanding, and personal connections despite the best support it can give or even in the enhancement it offers to learning. Human teachers

can provide nuanced feedback and understand the learning emotional and social context, changing tactics flexibly in real-time. It follows, therefore, that a blended approach combining the power of AI tools and the irreplaceable value of human instruction should be used for the best educational outcomes Zhao (2022).

From a more personal level, carrying out this study brought to light how much AI could contribute to language education. The most impressive thing was watching the interest and involvement of the students while using ChatGPT. It was evident that the interactive nature of AI made learning more enjoyable and, most importantly, instilled a deeper and more intuitive sense of understanding in synonyms among the students. This personal observation is supported by the considerable changes in the test scores of the experimental group. However, there are some points to note regarding the difficulties encountered during the study. One of the major challenges was to make sure that all students could have access to the same level of technology and connectivity to the internet. In an educational background, resources might not be so rich, so this can be one big barrier to the application of AI tools on a wide scale. Some other areas of concern are that at first, some of the students were not confident about their interaction with an AI, so to ensure that students embraced new technologies, a constant flow of support and reassurance from the system was necessary.

The findings of the present study open up further avenues for research. For instance, future longitudinal studies may investigate the long-term effects that the use of AI tools has on language development and retention. Research should also delve into the scalability of these AI-driven language learning tools in diverse educational settings and student populations. Similarly, the interfacing with augmented or virtual reality and AI itself provides a precursor to how these other emerging technologies will be integrated to engender more immersive and effective learning experiences (Ali, 2020; Liu et al., 2022). In teaching synonyms to EFL students, has great potential in increasing vocabulary acquisition. AI tools will fill the gaps left by traditional means of teaching with a personalised, interactive, and context-rich learning experience for diverse learning needs. Care has to be taken, however, in balancing this use of AI with human instruction and in ethical considerations associated with AI in education. Such insights may be used in guiding educators in the future by the implementation of AI for language learning that can maximise educational benefits while enforcing ethical and just practice.

Future recommendation

Through the evidence proffered by the current study, several recommendations can be made toward an enhanced utilisation and impact of AI tools in EFL education, including ChatGPT. The paper suggests that while making the best use of the AI power in language learning, the strengths of these tools need to be integrated into traditional teaching to maximise the benefits from both AI

and human instruction. AI can bring highly personalised, interactive, and context-rich learning experiences; human teachers bring nuanced feedback, cultural insights, and emotional support. Ongoing professional development and training for educators should be a priority to learn how to effectively use AI tools in classrooms with a clear understanding of tool features, integration strategies, and the ability to overcome potential challenges. Equitable technology access requires investments in high-speed Internet and up-to-date hardware, as well as support for students who do not have resources in their home. Ethical and privacy concerns must be accounted for in strong privacy policies, transparency about AI operations, and obtaining user consent. For students to accept and engage with this, educators must work to structure active engagement and solicitation of feedback, generating within the classroom a culture of appreciating the voice and exploration of students with AI tools. More empirical studies are required to investigate the long-term effects and scalability of AI-driven language learning, for example in a longitudinal study of sustained effects and effectiveness of AI across the board in diverse educational contexts. Design comprehensive AI literacy programs that educate not just students but also educators about the capabilities and limitations of AI, along with its ethical implications on informed and responsible use of AI tools. Thus, successful adoption of AI in education will require cooperation between teachers, administrators, policymakers, and technology developers so that the latter may design such educational tools with pedagogical aims in mind. Policymakers should provide support for such initiatives, along with the funding for research and infrastructure development. These processes can be developed by the institution as continuous improvement in the use of AI tools through a cycle of assessment, feedback, and incorporation of advances in the field of AI and educational technology. In so doing, both educators and institutions will avail themselves to maximise the affordances related to AI-powered tools like ChatGPT for language learning with the numerous considerations noted earlier—problems and ethical concerns—in the quest for more effective, engaging, and fair outcomes for EFL students.

Acknowledgement

The author hereby states that this study has not received any financial support from any party and has no conflict of interest.

References

- Abalkheel, A. (2022). Amalgamating Bloom's taxonomy and artificial intelligence to face the challenges of online EFL learning amid post-COVID-19 in Saudi Arabia. *International Journal of English Language and Literature Studies*, 11(1), 16–30.
<https://doi.org/10.18488/5019.v11i1.4409>

- Al-Abdullatif, A. M., & Alsubaie, M. A. (2022). Using digital learning platforms for teaching Arabic literacy: A post-pandemic mobile learning scenario in Saudi Arabia. *Sustainability*, 14(19), 11868. <https://doi.org/10.3390/su141911868>
- Alam, A. (2022). Employing adaptive learning and intelligent tutoring robots for virtual classrooms and smart campuses: Reforming education in the age of artificial intelligence. In *Advanced Computing and Intelligent Technologies: Proceedings of ICACIT 2022* (pp. 395–406). Singapore: Springer Nature Singapore. https://doi.org/10.1007/978-981-19-2980-9_32
- Alharbi, W. (2023). AI in the foreign language classroom: A pedagogical overview of automated writing assistance tools. *Education Research International*, 2023. <https://doi.org/10.1155/2023/4253331>
- Ali, Z. (2020). Artificial intelligence (AI): A review of its uses in language teaching and learning. In *IOP Conference Series: Materials Science and Engineering*, 769(1), 012043. <https://doi.org/10.1088/1757-899X/769/1/012043>
- Alsadoon, R. (2021). Chatting with AI bot: Vocabulary learning assistant for Saudi EFL learners. *English Language Teaching*, 14(6), 135–157.
- Alsamadi, M., Al-Marashdeh, I., Alzaqebah, M., Jadarat, G., Alghamdi, F., Mohammad, R., & others. (2021). Digitization of learning in Saudi Arabia during the COVID-19 outbreak: A survey. *Information, Medicine and Unlocked*, 25, 100632. <https://doi.org/10.1016/j.imu.2021.100632>
- Alzahrani, A. (2022). A systematic review of artificial intelligence in education in the Arab world. *Amazonia Investiga*, 11(54), 293–305. <https://doi.org/10.34069/AI/2022.54.06.28>
- Aydın, Ö., & Karaarslan, E. (2022). OpenAI ChatGPT generated literature review: Digital twin in healthcare. Available at SSRN 4308687. <https://doi.org/10.2139/ssrn.4308687>
- Bhbosale, S., Pujari, V., & Multani, Z. (2020). Advantages and disadvantages of artificial intelligence. *Aayushi International Interdisciplinary Research Journal*, 77, 227–230.
- Chang, Y., Lee, S., Wong, S., & Jeong, S. (2022). AI-powered learning application use and gratification: An integrative model. *Information Technology & People*, 35(7), 2115–2139. <https://doi.org/10.1108/ITP-09-2020-0632>
- Chapelle, C. (2007). Technology and second language acquisition. *Annual Review of Applied Linguistics*, 27, 98–114. <https://doi.org/10.1017/S0267190508070050>
- Chen, L., Chen, P., & Lin, Z. (2020). Artificial intelligence in education: A review. *IEEE Access*, 8, 75264–75278. <https://doi.org/10.1109/ACCESS.2020.2988510>
- Colak, I., Sagiroglu, S., & Kahraman, H. (2008, December). A user modeling approach to web based adaptive educational hypermedia systems. In *2008 Seventh International Conference on Machine Learning and Applications* (pp. 694–699). IEEE.

- Cotton, D. R., Cotton, P. A., & Shipway, J. R. (2023). Chatting and cheating: Ensuring academic integrity in the era of ChatGPT. *Innovations in Education and Teaching International*, 1–12. <https://doi.org/10.1080/14703297.2023.2190148>
- D’Cunha, S. (2022, July 29). Saudi Arabia makes a big LEAP in digital transformation. Martechvibe.com. <https://martechvibe.com/martech/saudi-arabia-makes-a-big-leap-in-digital-transformation/> (accessed on 20 March 2023).
- Drukker, L., Noble, J., & Papageorghiou, A. (2020). Introduction to artificial intelligence in ultrasound imaging in obstetrics and gynecology. *Ultrasound in Obstetrics and Gynecology*, 56, 498–505. <https://doi.org/10.1002/uog.22122>
- Ebadi, S., & Amini, A. (2022). Examining the roles of social presence and human-likeness on Iranian EFL learners’ motivation using artificial intelligence technology: A case of CSIEC chatbot. *Interactive Learning Environments*, 1–19. <https://doi.org/10.1080/10494820.2022.2096638>
- Fletcher, R. R., Nakeshimana, A., & Olubeko, O. (2021). Addressing fairness, bias, and appropriate use of artificial intelligence and machine learning in global health. *Frontiers in Artificial Intelligence*, 3, 561802. <https://doi.org/10.3389/frai.2020.561802>
- Fu, X., Krishna, L. K., & Sabitha, R. (2022). Artificial intelligence applications with e-learning system for China’s higher education platform. *Journal of Interconnection Networks*, 22(Supp02), 2143016.
- Gutiérrez, L. (2023). Artificial Intelligence in Language Education: Navigating the Potential and Challenges of Chatbots and NLP. *Research Studies in English Language Teaching and Learning*, 1(3), 180–191. <https://doi.org/10.62583/rseltl.v1i3.44>
- Hang, Y., Khan, S., Alharbi, A., & Nazir, S. (2022). Assessing English teaching linguistic and artificial intelligence for efficient learning using analytical hierarchy process and technique for order of preference by similarity to ideal solution. *Journal of Software: Evolution and Process*, e2462.
- Hargreaves, S. (2023). Words are flowing out like endless rain into a paper cup: ChatGPT & law school assessments. *The Chinese University of Hong Kong Faculty of Law Research Paper*, 2023-2003. <https://doi.org/10.2139/ssrn.4359407>
- Hew, K., Huang, W., Du, J., & Jia, C. (2023). Using chatbots to support student goal setting and social presence in fully online activities: Learner engagement and perceptions. *Journal of Computing in Higher Education*, 35(1), 40–68. <https://doi.org/10.1007/s12528-022-09338-x>
- Holmes, W., & Tuomi, I. (2022). State of the art and practice in AI in education. *European Journal of Education*, 57(4), 542–570.

- Huang, X., Zou, D., Cheng, G., Chen, X., & Xie, H. (2023). Trends, research issues and applications of artificial intelligence in language education. *Educational Technology & Society*, 26(1), 112–131. <https://www.jstor.org/stable/48707971>
- Hwang, G. J., Sung, H. Y., Hung, C. M., Huang, I., & Tsai, C. C. (2012). Development of a personalized educational computer game based on students' learning styles. *Educational Technology Research and Development*, 60, 623–638. <https://doi.org/10.1007/s11423-012-9241-x>
- Iliashenko, O., Bikkulova, Z., & Dubgorn, A. (2019). Opportunities and challenges of artificial intelligence in healthcare. In *E3S Web of Conferences (Vol. 110, p. 02028)*. EDP Sciences. <https://doi.org/10.1051/e3sconf/201911002028>
- Ilkka, T. (2018). The impact of artificial intelligence on learning, teaching, and education. *European Union*.
- Jia, F., Sun, D., Ma, Q., & Looi, C. (2022). Developing an AI-based learning system for L2 learners' authentic and ubiquitous learning in English language. *Sustainability*, 14, 15527. <https://doi.org/10.3390/su142315527>
- Kang, B., & Kang, S. (2022). Construction of Chinese language teaching system model based on deep learning under the background of artificial intelligence. *Scientific Programming*, 2022, Article ID 3960023. <https://doi.org/10.1155/2022/3960023>
- Kasneci, E., Seßler, K., Küchemann, S., Bannert, M., Dementieva, D., Fischer, F., & Kasneci, G. (2023). ChatGPT for good? On opportunities and challenges of large language models for education. *Learning and Individual Differences*, 103. <https://doi.org/10.1016/j.lindif.2023.102274>
- Khan, A. A., Sadriwala, M., & Mohammad, M. (2022). Role of ICT in improving English communication in Saudi Arabia. In *ICT Systems and Sustainability: Proceedings of ICT4SD 2022* (pp. 735–751). Singapore: Springer Nature Singapore. https://doi.org/10.1007/978-981-19-5221-0_69
- Kohnke, L. (2023). L2 learners' perceptions of a chatbot as a potential independent language learning tool. *International Journal of Mobile Learning and Organisation*, 17(1–2), 214–226. <https://doi.org/10.1504/IJMLO.2023.128339>
- Kuleto, V., Ilić, M., Dumangiu, M., Ranković, M., Martins, O. M., Păun, D., & Mihoreanu, L. (2021). Exploring opportunities and challenges of artificial intelligence and machine learning in higher education institutions. *Sustainability*, 13(18), 10424. <https://doi.org/10.3390/su131810424>
- Lee, H. (2023). The rise of ChatGPT: Exploring its potential in medical education. *Anatomical Sciences Education*. <https://doi.org/10.1002/ase.2270>

- Liu, X., Faisal, M., & Alharbi, A. (2022). A decision support system for assessing the role of the 5G network and AI in situational teaching research in higher education. *Soft Computing*, 26(20), 10741–10752. <https://doi.org/10.1007/s00500-022-06957-5>
- Maddigan, P., & Susnjak, T. (2023). Chat2vis: Generating data visualisations via natural language using ChatGPT, Codex and GPT-3 large language models. *arXiv preprint arXiv:2302.02094*. <https://doi.org/10.48550/arXiv.2302.02094>
- Meho, L. I. (2006). E-mail interviewing in qualitative research: A methodological discussion. *Journal of the American Society for Information Science and Technology*, 57(10), 1284–1295. <https://doi.org/10.1002/asi.20416>
- Mhlanga, D. (2023). Open AI in education, the responsible and ethical use of ChatGPT towards lifelong learning. *Education, the Responsible and Ethical Use of ChatGPT Towards Lifelong Learning (February 11, 2023)*. <https://doi.org/10.2139/ssrn.4354422>
- Mohamed, A. M. A., & Shaaban, T. S. K. (2021). The effects of educational games on EFL vocabulary learning of early childhood students with learning disabilities: A systematic review and meta-analysis. *International Journal of Linguistics, Literature and Translation*, 4(3), 159–167. <https://doi.org/10.32996/ijllt.2021.4.3.18>
- O'Connor, S. (2022). Open artificial intelligence platforms in nursing education: Tools for academic progress or abuse? *Nurse Education in Practice*, 66. <https://doi.org/10.1016/j.nepr.2022.103537>
- Qadir, J. (2022). Engineering education in the era of ChatGPT: Promise and pitfalls of generative AI for education. <https://doi.org/10.36227/techrxiv.21789434.v1>
- Qasem, F., Ghaleb, M., Mahdi, H. S., Khateeb, A. A., & Fadda, A. H. (2023). Dialog chatbot as an interactive online tool in enhancing ESP vocabulary learning. *Saudi Journal of Language Studies*. <https://doi.org/10.1108/SJLS-10-2022-0072>
- Radford, A., Wu, J., Child, R., Luan, D., Amodei, D., & Sutskever, I. (2019). Language models are unsupervised multitask learners. *OpenAI blog*, 1(8), 9.
- Ruan, S., Jiang, L., Xu, Q., Liu, Z., Davis, G. M., Brunskill, E., & Landay, J. A. (2021, April). Englishbot: An AI-powered conversational system for second language learning. In *26th International Conference on Intelligent User Interfaces* (pp. 434–444).
- Rudolph, J., Tan, S., & Tan, S. (2023). ChatGPT: Bullshit spewer or the end of traditional assessments in higher education? *Journal of Applied Learning and Teaching*, 6(1). <https://doi.org/10.37074/jalt.2023.6.1.9>
- Russel, S. J., & Norvig, P. (2010). *Artificial intelligence: A modern approach* (3rd ed.). Pearson Education.

- Schreuder, H. T., Gregoire, T. G., & Weyer, J. P. (2001). For what applications can probability and non-probability sampling be used? *Environmental Monitoring and Assessment*, 66, 281–291.
- Seidman, I. (2006). *Interviewing as qualitative research: A guide for researchers in education and the social sciences*. Teachers College Press.
- Shaaban, T. S., & Mohamed, A. M. (2023). Exploring the effectiveness of augmented reality technology on reading comprehension skills among early childhood pupils with learning disabilities. *Journal of Computers in Education*, 1–22. <https://doi.org/10.1007/s40692-023-00269-9>
- Sun, G. H., & Hoelscher, S. H. (2023). The ChatGPT storm and what faculty can do. *Nurse Educator*. <https://doi.org/10.1097/NNE.0000000000001390>
- Tawil, H. (2019). Enhancing language learning through technology. *Journal of English Language Teaching*, 7, 1–18.
- Tlili, A., Shehata, B., Adarkwah, M. A., Bozkurt, A., Hickey, D. T., Huang, R., & Agyemang, B. (2023). What if the devil is my guardian angel: ChatGPT as a case study of using chatbots in education. *Smart Learning Environments*, 10(1), 15. <https://doi.org/10.1186/s40561-023-00237-x>
- Topsakal, O., & Topsakal, E. (2022). Framework for a foreign language teaching software for children utilizing AR, voicebots and ChatGPT (large language models). *The Journal of Cognitive Systems*, 7(2), 33–38. <https://doi.org/10.52876/jcs.1227392>
- Van Dis, E. A., Bollen, J., Zuidema, W., van Rooij, R., & Bockting, C. L. (2023). ChatGPT: Five priorities for research. *Nature*, 614(7947), 224–226.
- Wang, F. Y., Miao, Q., Li, X., Wang, X., & Lin, Y. (2023). What does ChatGPT say: The DAO from algorithmic intelligence to linguistic intelligence. *IEEE/CAA Journal of Automatica Sinica*, 10(3), 575–579. <https://doi.org/10.1109/JAS.2023.123486>
- Warschauer, M., & Healey, D. (1998). Computers and language learning: An overview. *Language Teaching*, 31(2), 57–71. <https://doi.org/10.1017/S0261444800012970>
- Wei, G., & Niemi, H. (2023). Ethical guidelines for artificial intelligence-based learning: A transnational study between China and Finland. In: Niemi, H., Pea, R. D., Lu, Y. (Eds.) *AI in learning: Designing the future*. Springer, Cham. https://doi.org/10.1007/978-3-031-09687-7_16
- Weizenbaum, J. (1966). ELIZA—A computer program for the study of natural language communication between man and machine. *Communications of the ACM*, 9(1), 36–45. <https://doi.org/10.1145/365153.365168>
- Xia, Q., Chiu, T., Chai, C., & Xie, K. (2023). The mediating effects of needs satisfaction on the relationships between prior knowledge and self-regulated learning through artificial

intelligence chatbot. *British Journal of Educational Technology*.

<https://doi.org/10.1111/bjet.13305>

Zhao, X. (2022). Leveraging artificial intelligence (AI) technology for English writing: Introducing wordtune as a digital writing assistant for EFL writers. *RELC Journal*, 00336882221094089.

Copyrights

Copyright for this article is retained by the author(s), with first publication rights granted to the journal. This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).