Ed Process Int J

www.edupij.com

ISSN 2147-0901 (Print), 2564-8020 (Online)

EDUCATIONAL PROCESS
INTERNATIONAL JOURNAL

Grammar Gains: Transforming EFL Learning with ChatGPT

Behnam Behforouz, Ali Al Ghaithi

Research Article

Cite this article: Behforouz, B., & Al Ghaithi, A. (2024). Grammar gains: Transforming EFL learning with ChatGPT. *Educational Process: International Journal, 13*(4): 25-41. https://doi.org/10.22521/edupij.2024.134.2

Received July 07, 2024
Accepted November 29, 2024
Published Online December 10, 2024

Keywords: ChatGPT, EFL learning, quantitative study, grammar gains

Author for correspondence:
Behnam Behforouz
Behnam.Behforouz@utas.edu.om
University of Technology and Applied Sciences, Shinas, Oman

OPEN ACCESS

© The Author(s), 2024. This is an Open Access article, distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (https://creativecommons.org/licenses/by/4.0/), which permits unrestricted re-use, distribution, and reproduction, provided the original article is properly cited.

Abstract

Background/purpose. The present quantitative study investigated the effectiveness of utilizing ChatGPT as an instructional tool to enhance the learners` grammatical proficiency.

Materials/methods. The study involved 60 Omani intermediate EFL learners randomly divided into three groups with 20 learners. The control group received traditional face-to-face instruction. Experimental group 1 received in-class instruction supplemented by ChatGPT, which provided feedback on grammatical structures. Experimental Group 2 engaged in fully online instruction, with ChatGPT as the primary feedback facilitator for grammatical tasks. Some researcher-made grammar tests were designed and piloted before the study to ensure the reliability and validity of the assessment tools.

Results. Statistical analysis indicated that all groups improved grammatical proficiency from the pretest to the posttest. However, the progress observed in Experimental Group 1 was statistically more significant. The comparison of the pretest and delayed posttest scores revealed a sustained improvement in the scores of Experimental Group 1, indicating the long-term efficacy of combining in-class instruction with ChatGPT feedback. In contrast, the scores of both the Control Group and Experimental Group 2 showed a notable decline from the posttest to the delayed posttest, suggesting limited retention of grammatical knowledge in these groups.

Conclusion. ChatGPT makes it possible to give particular feedback that adapts to the process, enhancing motivation and facilitating learning in various ways. The research validates the educational advantages of ChatGPT but recommends additional studies on its usefulness for working with various populations of students, various types of grammar as well as the quality of students and their teachers' attitudes and abilities to utilize technology.

1. Introduction

Language scholars have recently focused on the use of Information Technology (IT) in the instruction and learning of languages (Ahmadi, 2018; Lai et al., 2022; Lei et al., 2022; Shadiev et al., 2023; Shadiev & Yang, 2020; Soleimani et al., 2022). By facilitating individualized, engaging, and communicative learning processes, the use of technology in the teaching of languages improved the educational experience of students (Chun et al., 2016; Fathi & Rahimi, 2024; Rodinadze & Zarbazoia, 2012; Shatri, 2020;). Instructors of languages have embraced IT to build digital language learning settings that actively involve students and speed up language acquisition (Loncar et al., 2023; Nguyen & Le, 2023). Artificial intelligence (AI) has become an exciting instrument in information technology applications, used in teaching and learning languages to improve students' learning outcomes (Huang et al., 2023; Knox, 2020; Pikhart, 2020).

Artificial intelligence (AI) has revolutionized many sectors, including education and language acquisition (Balyen & Peto, 2019; Su et al., 2023). AI presents new opportunities for improving educational methods and students` results because of its capacity to handle enormous volumes of data, identify intricate patterns, and provide individualized insights (Ouyang & Jiao, 2021; Roll & Wylie, 2016). Teachers have incorporated AI-assisted learning resources into the classroom to help students improve their proficiency (Lu, 2018; Tafazoli et al., 2019).

Artificial intelligence-enabled learning solutions are renowned for producing immersive and captivating settings, enabling students to efficiently complete language learning assignments and enhance their general language ability (Divekar et al., 2022). For example, Xu et al. (2023) studied the effect of AI-powered language acquisition instruments on the total learning accomplishment of students who studied English and discovered that these tools helped learners reach their goals. In addition, Hsu et al. (2023) researched AI-assisted language acquisition instruments on the understanding of vocabulary by EFL students. The results showed that learners who used artificial intelligence instruments outperformed their classmates and showed notable improvements in vocabulary knowledge. Furthermore, Junaidi (2020) discovered that AI students performed better than non-AI students in speaking competence, examining the contribution of AI-assisted language acquisition instruments in improving the speaking abilities of EFL students. Wei (2023) also found that AI-mediated teaching had a beneficial effect on English learning accomplishment in terms of grammar, words, reading skills, writing, L2 encouragement, and self-regulated learning. The impact of an engaging WhatsApp bot on the listening comprehension skills of Omani students was evaluated by Behforouz and Al Ghaithi (2024), and the study's findings revealed that the treatment group's performance, the group who received extra practice and activities using an interactive chatbot, was noticeably higher than their counterparts in the control group.

Among all the existing AI tools, ChatGPT could benefit language learners within the language acquisition process (Baskara & Mukarto, 2023; Hong, 2023; Kohnke et al., 2023). It offers substitute sentences to help students write better and advances studies by providing language feedback (Su et al., 2023; Yan, 2023). ChatGPT may serve as an intelligent helper throughout the learning process, offering interactive support to students wherever and whenever they need it. In addition to answering queries, ChatGPT may organize data, help students prepare for exams, and provide comments (Lo, 2023). With ChatGPT, students may discuss new issues and suggestions for handling assignments and challenging learning circumstances (Malinka et al., 2023). Conversations on the produced justifications, answers, and recommendations may aid in developing reading and writing abilities. The use of ChatGPT in the classroom facilitates adaptive and individualized learning. ChatGPT can provide tailored materials and learning tasks that match each learner's unique preferences for learning and educational requirements, according to the study of their behavior and discussion (Rahman & Watanobe, 2023). With ChatGPT, students may acquire new digital abilities that are crucial in today's technologically advanced world. To get good replies, learners must

https://doi.org/10.22521/edupij.2024.134.2 Published online by Universitepark Press

construct the correct queries and prompts, implement the tasks, and provide clear instructions (Ivanov & Soliman, 2023).

Additionally, ChatGPT may help teachers create learning and evaluation resources more quickly and efficiently, freeing them up to concentrate on more intricate pedagogy and course design (Chan & Lee, 2023). Teachers may develop ideas for classes, presentations, training schedules, and hands-on courses using ChatGPT as an innovation generator (Gimpel et al., 2023). ChatGPT assists teachers with creating tests and homework, evaluating them, and giving them tailored feedback (Chen et al., 2020). By using adaptive teaching methodologies and providing timely assistance, educators may monitor students' development and clearly understand their work and accomplishments (Adıgüzel et al., 2023). Giving students individualized feedback makes it possible to pinpoint problem areas and focus performance development efforts (Farrokhnia et al., 2024). For many students, immediate feedback is crucial since it enables them to rectify mistakes, explain complex ideas, study at their own speed, and not depend exclusively on the teacher (Dai et al., 2023). In addition to being crucial for students with unique educational requirements, instant, specific feedback and tailored learning pathways boost enthusiasm and participation, improve results, and raise student satisfaction (Adıgüzel et al., 2023).

Therefore, this study shall investigate Chat GPT's effectiveness in grammatical knowledge development among Omani intermediate EFL learners and contribute to a valuable gap in the literature about lesser-discussed big language models in language teaching. Although there have indeed been numerous prior studies on how AI-powered tools enhance multiple dimensions of language proficiency, such as vocabulary building (Hsu et al., 2023), effective oral communication (Junaidi, 2020), and overall academic performance (Xu et al., 2022), few empirical studies have been conducted concerning the effectiveness of ChatGPT for grammatical instruction. Most recent research has concentrated on either general AI-enhanced tools or traditional chatbot platforms, with minimal regard for the almost unexplored potential of state-of-the-art language models (Baskara & Mukarto, 2023). Accordingly, this paper investigates the possible impact of the ChatGPT tool, which features advanced contextual understanding and response on grammatical accuracy and retention for EFL students. It enhances the field of language education by highlighting the potential outcomes that could result from incorporating sophisticated AI technologies into pedagogical practices. The following research questions will be investigated thoroughly too:

1. Does ChatGPT affect the improvement of the grammatical knowledge of Omani intermediate EFL learners?
2. Does Omani EFL learners' grammatical knowledge benefit more from traditional classes or the classes enhanced with ChatGPT?

2. Literature Review

2.1. Theoretical Framework

Sociocultural theory is primarily associated with the work of Lev Vygotsky and focuses on the role of interaction and social context in learning. It introduces the concept of the Zone of Proximal Development (ZPD) or the difference between what learners can achieve independently and what they can achieve with help or scaffolding. ChatGPT is an interactive tool that aligns with the learners' Zone of Proximal Development through direct feedback, explanations, and examples. Such contact internalizes grammatical norms and encourages autonomous application (Lantolf & Thorne, 2006).

Cognitive Load Theory, proposed by John Sweller, emphasizes the cognitive demands associated with learning activities. This idea is pertinent to ChatGPT since the tool reduces superfluous cognitive burden by streamlining explanations and feedback on the learner's skill level. Through the organization of activities and prompt clarification, ChatGPT aids learners in concentrating on the

https://doi.org/10.22521/edupij.2024.134.2 Published online by Universitepark Press

inherent cognitive burden associated with comprehending and implementing grammar principles (Paas et al., 2003).

According to the constructivist learning theory described by Piaget and later elaborated by Bruner, it explains that the learner himself builds up knowledge with the help of experiences and reflection. ChatGPT will allow interaction in context, whereby learners can practice the use of language and get a response. For example, learners can type in phrases and get specific corrections, using the trial-and-error approach to solidify grammatical concepts (Bruner, 1966).

The Lexical Approach, advocated by Michael Lewis, points out the significance of vocabulary in acquiring grammatical structures. ChatGPT helps learners observe and practice grammatical forms within lexical chunks, with indicative examples and acting out the corrections to show how they are used naturally. Providing grammar training within authentic language patterns reinforces the principle that grammar emanates from lexical use (Lewis, 1993).

Behaviorist theory is commonly associated with B.F. Skinner, whereby learning is obtained through repetition, reinforcement, and response. Thus, ChatGPT acts like a stimulus-response system that provides immediate feedback to correct mistakes and reinforce grammatically correct expressions. This leads to the operant conditioning model, wherein positive reinforcement of correct responses strengthens learning (Skinner, 1957).

2.2. ChatGPT in Education

The function of ChatGPT in foreign language education has been investigated by Kohnke et al. (2023), who considered the benefits of practicing the language via regular chats. The research examined how students' fear may be dispelled by having open discussions, sparking their curiosity in learning the language, and providing more engaging instruction. According to Baskara and Mukarto (2023), ChatGPT can generate realistic conversations that offer students real-world examples of language usage; however, the ethical and social ramifications of ChatGPT in language education necessitate comprehensive examination, focusing on its effects on educators, students, and society as a whole. It will allow complete comprehension of the ethical and social issues related to this technology. The establishment of methodologies and instruments for evaluating the efficacy of ChatGPT for language learning is also central to guaranteeing safety and effectiveness. Such methods may involve assessments for accuracy, coherence, and bias in its output. Also, it is vital to research the limitations regarding the treatment of more complicated or abstract linguistic concepts to understand how it works and what it can and cannot do. Examining the correlation between ChatGPT and language acquisition in higher education may also prove beneficial. This can ascertain the extent to which ChatGPT can facilitate language acquisition, offering pathways for further study.

A study by Rahman and Watanobe (2023) examined the advantages and disadvantages of using ChatGPT in education. It used ChatGPT to demonstrate how effectively it can assist in the learning context. According to a survey completed by 20 professors and 40 learners, ChatGPT can help problem-solve and provide feedback. The survey also identified potential risks, such as the misuse of online tests.

The usefulness of ChatGPT in improving English grammar proficiency in fifteen EFL students was examined by Phieanchang (2024). As part of the process, ChatGPT was used to provide individualized learning tasks to the intervention group. The program offered individually customized grammar drills, reminders, and immediate feedback. Pretests and posttests were conducted to gather information on the prevalence of grammatical errors. After using ChatGPT, the findings revealed that the treatment group made fewer mistakes than the control group. This suggests that ChatGPT successfully addresses deficiencies and develops grammar competency for individualized learning tasks.

https://doi.org/10.22521/edupij.2024.134.2 Published online by Universitepark Press

The effects of using ChatGPT in foreign language instruction on thirteen pupils attending preparatory classes were examined by Karataş et al. (2024). Over four weeks, learners engaged with ChatGPT through various tasks. Interviews were conducted to gather information on ChatGPT's impact on educational experiences and learners' opinions on its advantages and drawbacks. According to the results, ChatGPT enhances learners' learning experiences, particularly in writing, grammar, and word acquisition. It also increases interest and motivation due to its adaptability and user-friendliness for various learning tasks. Nonetheless, a notable worry arising from the results was possible over-dependence on ChatGPT. This worry corresponds with current studies suggesting that over-dependence on AI tools may result in skill degradation and impede the cultivation of critical thinking and learner independence. The participants' concerns highlight the necessity for a balanced strategy incorporating AI technologies like ChatGPT into the language learning curriculum. This analysis underscores the critical role of educators in ensuring the prudent use of AI technologies, which should complement rather than supplant the job of instructors. Conversely, experiencing technical issues with connectivity and limitations in addressing human emotions and personal expressions are other downsides of the technology.

Wei (2023) conducted a study examining the impact of AI-assisted language acquisition on English proficiency, motivation, and autonomous learning among a cohort of sixty Chinese learners of English. The control group was subjected to traditional educational methods, whereas the treatment group underwent instruction facilitated by artificial intelligence. All participants in both groups undertook pretests and posttests evaluating their English proficiency alongside a questionnaire assessing self-regulated learning. Additionally, fourteen learners from the treatment group engaged in interviews. Statistical comparisons indicated that the treatment group outperformed the control group significantly in motivation and self-regulated learning, while it outperformed it significantly in English academic achievement in grammar, vocabulary, reading, and writing. Qualitative findings through interviews revealed that AI-enhanced motivation, flexibility in learning, and interaction.

Song and Song (2023) examined how AI-assisted language acquisition affected the academic writing abilities and motivation of 50 Chinese EFL learners. Learners were randomly assigned to either the treatment group (receiving AI-assisted education using ChatGPT) or the control group (receiving regular instruction). Writing samples were collected as pretests and posttests, and evaluation rubrics were used to assess improvements. Interviews were also conducted to gain insights into learners' perspectives. The results revealed that the treatment group demonstrated higher proficiency in grammar, vocabulary, organization, and coherence than the control group. Additionally, the research showed that the treatment group exhibited better writing abilities and motivation than the control group.

3. Methodology

3.1. Participants

To collect the required data, 60 Omani English as a Foreign Language (EFL) learners were the main population of the study. These students were in the intermediate English proficiency level based on the academic criteria of the college. Their age ranged from 18 to 21, and they spoke Arabic as their native language.

Oman's national curriculum mandates that participants complete one to two academic years in the General Foundation Program (GFP). The GFP program is mandatory and a prerequisite for higher education in Oman. Thus, to access the specialist departments, the GFP program provides students with various subjects, including English, Mathematics, and Information Technology, employing English as the medium of instruction.

https://doi.org/10.22521/edupij.2024.134.2 Published online by Universitepark Press

These students were divided into three groups using random sampling, with an equal number of students in each group. Group 1 was the control group that participated in regular face-to-face classes. Experimental Group 1 received regular instructions within the class and extra training and feedback through ChatGPT, and the last group, Experimental Group 2, received training entirely online using Microsoft Teams and got feedback using ChatGPT.

3.2. Instruments

The following instruments were employed to collect the required data:

To evaluate the effect of ChatGPT on the English grammar abilities of Omani learners, the investigators developed three researcher-made tests that would be administered as a pretest, posttest, and delayed posttest. These tests focused on the past simple and past continuous tenses. Each exam consisted of two sections and a total of 20 questions. The overall score was 20 marks, as each question was worth 1 mark. The initial section included 10 questions with multiple choices. The subsequent section included another 10 questions based on sentence correction.

Before the beginning of the study, these tests were piloted with 60 Omani EFL learners from the same institution with the same proficiency level. All the groups were given a common date and time to conduct the pilot study, which was determined and promptly announced to the pilot groups. The participants had 30 minutes to complete the exam. The analysis of the pilot tests revealed the Cronbach Alpha reliability of 0.887, 0.850, and 0.790 for pretest, posttest, and delayed posttest, respectively, which meant the tests were highly reliable. In addition to reliability, the tests were examined by three Omani PhD holders of Applied Linguistics with teaching and research experience of 15 years to ensure validity.

3.3. Procedures

The present investigation took place during the autumn semester of 2024-2025. Participants were informed that their involvement in the study was voluntary. The study was conducted in five weeks. In week 1, a pretest was administered among all the groups to assess the students' grammar skills and ensure the homogeneity of their knowledge before implementing the treatment. The pretest lasted for 30 minutes. Although the control group and experimental group 1 received grammar instructions within the class, the experimental group 1 utilized ChatGPT for additional grammar practice outside the classroom. The experimental group 2, participating in fully online training through Microsoft Teams, also used ChatGPT to facilitate their learning process. The experimental groups were assigned ChatGPT accounts created by the researchers to monitor the student's progress in ChatGPT and ensure that they followed the instructions and completed their assignments as requested. Following this, the investigators conducted a one-hour workshop to guide the treatment groups on how to use ChatGPT for grammar practice and address any potential issues.

In the second week, all groups studied three sessions about the three forms of the past simple: positive, negative, and question forms. In the third week, the researchers taught the three forms of the past continuous in three sessions. The duration of the lesson was 1 hour for all the groups. In the experimental groups, students were given homework consisting of two parts related to the tense form studied that day. The first task contained 20 sentences that were miswritten in grammar. In this task, the students should first write the correct form of the sentences and provide the reasons. The second task included another 20 fill-in-the-blanks in which the learners should use the grammatically correct form of the verbs of the brackets (Table 1). The duration of the task was 30 minutes. Afterward, the researcher requested that the students check their answers using ChatGPT at home. Figure 1 shows an example of the activities in which students engaged with ChatGPT. The control group practiced a similar activity within the classroom. In week 4, the researchers gave both groups

https://doi.org/10.22521/edupij.2024.134.2 Published online by Universitepark Press

a grammar posttest. One week later, delayed grammar tests were conducted for all the groups. In all the test sessions, students were given 30 minutes to complete the tasks.

Table 1. Examples of Task 1 and Task 2

Task 1	Task 2
The sentence is written in the incorrect positive form of past simple. Rewrite the sentences again and state the reason why. o Ali meets Ahmed 3 months ago. Write the correction: _____ Reason: _____	Complete the text with the correct positive form of past simple Last week, Ali and Mohammad 1_____(watch) a film at the cinema. After that, they 2_____(eat) their dinner. Justification 1: Justification 2:

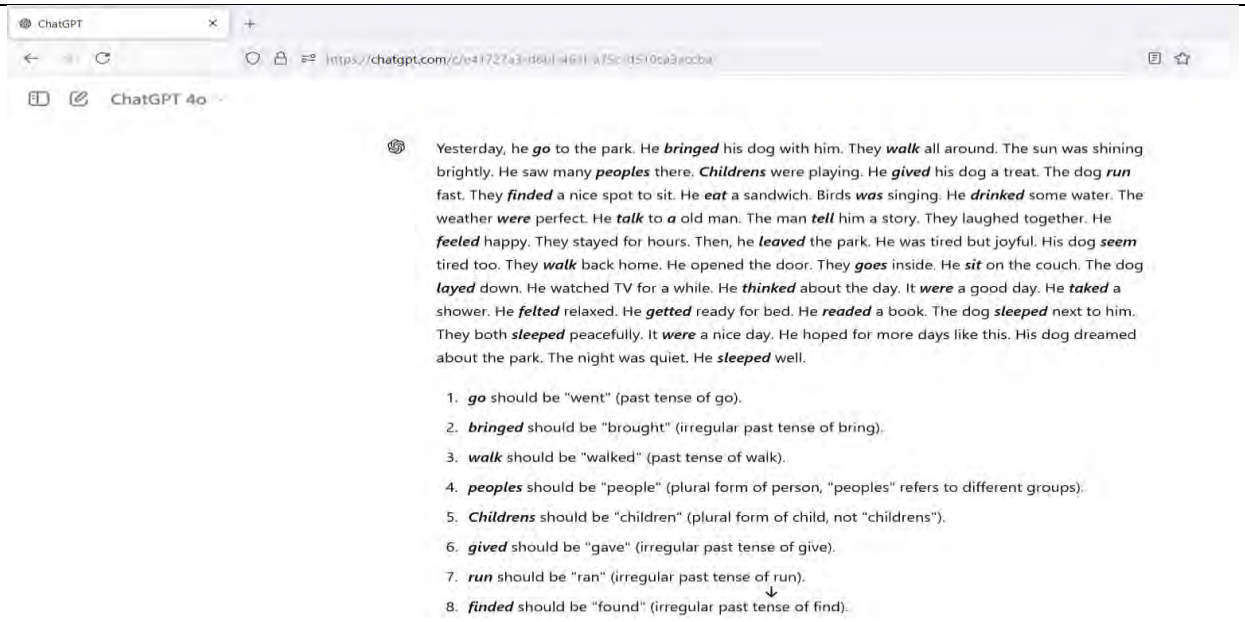

Figure 1. An Example of Using ChatGPT to Receive Feedback on Simple Past

3. Results

To investigate the effect of ChatGPT on the grammar improvements of students, some statistical analyses were conducted using SPSS version 27.0. The first step was to analyze the normality of data to select the appropriate parametric or non-parametric test for further analysis of pretests, posttests, and delayed posttests. The results of the normality analysis can be observed in Table 2.

https://doi.org/10.22521/edupij.2024.134.2 Published online by Universitepark Press

Table 2. Shapiro-Wilk Normality Test of all Groups in 3 Sets of Tests

		Shapiro-Wilk		
	groups	Statistic	df	Sig.
pretest	control	.884	20	.021
	experimental 1	.873	20	.014
	experimental 2	.873	20	.014
posttest	control	.947	20	.319
	experimental 1	.863	20	.009
	experimental 2	.863	20	.009
Delayed. posttest	control	.812	20	.001
	experimental 1	.863	20	.009
	experimental 2	.813	20	.001

The findings for the control and two experimental groups in Table 2 exhibit different levels of normality. The pretest results showed a non-normal distribution for the control group (0.884; p=0.021), experimental group 1 (0.873; p=0.014), and experimental group 2 (0.873; p=0.014). In the post-test, experimental 1 and experimental 2 groups had 0.863 (p=0.009), indicating a non-normal distribution, while the control group had a statistic of 0.947 (p=0.319), implying a normal distribution. The results of the delayed posttest showed that the experimental groups had non-normal distributions: experimental group 1 had a statistic of 0.863 (p=0.009), experimental group 2 had 0.813 (p=0.001), and the control group had a statistic of 0.812 (p=0.001). Therefore, a non-parametric test was run separately for each group to measure participants' progress within each group. Table 3 below shows the results of this test within the control group.

Table 3. Wilcoxon-Signed Rank Test within the Control Group

	posttest - pretest	delayed.posttest - pretest	delayed.posttest - posttest
Z	3.621	-2.828	-3.552
Asymp. Sig. (2-tailed)	.000	.005	.000

Table 3 compared the posttest to the pretest, revealing a statistically significant improvement in scores from the pretest to the posttest, with a Z-score of 3.621 and a p-value of less than .001, suggesting solid and considerable progress after the intervention. The results showed decreased scores from the pretest to the delayed posttest, with a Z-score of -2.828 and a p-value of .005. This indicates that the improvements reported in the post-test could not be maintained over time. Ultimately, the analysis of the posttest and delayed posttest revealed a remarkable decline in scores from the posttest to the delayed posttest, with a Z-score of -3.552 and a p-value of less than .001. Table 4 shows the comparison results within the experimental group 1 in three sets of tests.

https://doi.org/10.22521/edupij.2024.134.2 Published online by Universitepark Press

Table 4. Results of the Wilcoxon-Signed Rank Test within the Experimental Group 1

	posttest - pretest	delayed.posttest - pretest	delayed.posttest - posttest
Z	3.966	3.999	.000
Asymp. Sig. (2-tailed)	.000	.000	1.000

Table 4 shows significant differences between the pretest and posttest scores ($Z = 3.966$, $p < .001$), as well as between the pretest and delayed posttest scores ($Z = 3.999$, $p < .001$). These findings indicate notable improvements in performance after the intervention, which were sustained over time. In contrast, the analysis of the posttest and delayed posttest scores ($Z = .000$, $p = 1.000$) indicates no statistically significant change. This suggests that the progress made from the pretest to the posttest was maintained in the delayed posttest. Table 5 below reveals the analysis of the three sets of tests within experimental group 2.

Table 5. Results of the Wilcoxon-Signed Rank Test within the Experimental Group 2

	posttest - pretest	delayed.posttest - pretest	delayed.posttest - posttest
Z	3.998	-2.114	-3.968
Asymp. Sig. (2-tailed)	.000	.034	.000

Table 5 suggests statistically significant differences in all comparisons. The pretest and posttest scores exhibit a notable disparity ($Z = 3.998$, $p < .001$), indicating a major enhancement following the intervention. However, the pretest and delayed posttest scores exhibit a notable disparity ($Z = -2.114$, $p = .034$), indicating that the scores decreased toward the delayed posttest. The comparison between the posttest and delayed posttest scores ($Z = -3.968$, $p < .001$) shows the decrease in the scores of the experimental group 2. Table 6 compares the groups in all sets of tests.

Table 6. Results of the Kruskal-Wallis Test in Comparing all the Groups in all Sets of Exams

	pretest	posttest	delayed.posttest
Kruskal-Wallis H	.026	51.356	41.122
df	2	2	2
Asymp. Sig.	.987	.000	.000

Based on the findings of Table 6, there was no statistically significant difference between the pretest scores of the groups ($H = 0.026$, $p = 0.987$), indicating that the groups were similar at the baseline. The posttest ($H = 51.356$, $p < 0.001$) and delayed posttest ($H = 41.122$, $p < 0.001$) scores showed substantial variation across the groups. These results suggest that, although the groups began at equal levels following the interventions, their performance differed significantly. A post-hoc test was performed to measure the size of this difference, and the results are shown in Table 7.

https://doi.org/10.22521/edupij.2024.134.2 Published online by Universitepark Press

Table 7. The Results of the Bonferroni Test of Comparison between the Groups

Variable	group	group	Mean Difference	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
pretest	control	experimental 1	.05000	.34259	1.000	-.7951	.8951
		experimental 2	.05000	.34259	1.000	-.7951	.8951
	experimental 1	control	-.05000	.34259	1.000	-.8951	.7951
		experimental 2	.00000	.34259	1.000	-.8451	.8451
	experimental 2	control	-.05000	.34259	1.000	-.8951	.7951
		experimental 1	.00000	.34259	1.000	-.8451	.8451
posttest	control	experimental 1	-7.95000*	.39057	.000	-8.9134	-6.9866
		experimental 2	-4.95000*	.39057	.000	-5.9134	-3.9866
	experimental 1	control	7.95000*	.39057	.000	6.9866	8.9134
		experimental2	3.00000*	.39057	.000	2.0366	3.9634
	experimental 2	control	4.95000*	.39057	.000	3.9866	5.9134
		experimental 1	-3.00000*	.39057	.000	-3.9634	-2.0366
delayed. posttest	control	experimental 1	-9.60000*	.28654	.000	-10.3068	-8.8932
		experimental 2	-.10000	.28654	1.000	-.8068	.6068
	experiemtnal1	control	9.60000*	.28654	.000	8.8932	10.3068
		experimental 2	9.50000*	.28654	.000	8.7932	10.2068
	experimental 2	control	.10000	.28654	1.000	-.6068	.8068
		experimental 1	-9.50000*	.28654	.000	-10.2068	-8.7932

The Bonferroni post hoc tests on the pretest data indicated no statistically significant differences between the groups ($p = 1.000$). However, in the posttest, there were significant disparities between the control group and both experimental groups, with mean differences of -7.95000 ($p < 0.001$) and -4.95000 ($p < 0.001$) for experimental 1 and experimental 2, respectively. Furthermore, there were significant differences between experimental 1 and experimental 2 groups, with a mean difference of 3.00000 ($p < 0.001$). The delayed posttest outcomes demonstrated notable disparities between the control group and experimental 1 group (mean difference = -9.60000, $p < 0.001$) but no difference between the control group and experimental 2 ($p = 1.000$). Experimental 1 and experimental 2 exhibit significant differences, with a mean difference of -9.50000 and a p-value less than 0.01. These data indicate that the interventions substantially impacted the scores obtained in the posttest and delayed posttest. Nevertheless, the absence of a notable distinction between the control group and experimental group 2 in the delayed posttest suggests a decline in the effectiveness of the

https://doi.org/10.22521/edupij.2024.134.2 Published online by Universitepark Press

intervention with time or variations in its effects. To have a clear view of the size differences among the groups, Table 8 below provides more information.

Table 8. The Results of Cohen's d Comparison among the Groups in all the Tests

Comparison	Posttest Cohen's d	Delayed Posttest Cohen's d
experimental 1 & control	6.24	10.01
experimental 2 & control	3.88	0.132
experimental 1 & experimental 2	2.62	9.63

As shown in Table 8, the comparison of experimental 1 and control groups shows Cohen's d of 6.24 in the posttest and 10.01 in the delayed posttest. These represent the enormous effect sizes that could be considered as the intervention results of experimental group 1. The comparison of experimental 2 and control groups based on Cohen's d in the posttest shows 3.88, and this means a large effect size of treatment on the experimental 2 group; however, the comparison of two groups in the delayed posttest shows Cohen's d of 0.132 which means petite effect size. This means that these groups could not maintain the positive effect of the treatment in the delayed posttest. Finally, the comparison of experimental 1 and experimental 2 in the posttest revealed Cohen's d of 2.62, showing a large effect size and the strong effect of treatment on the experimental 1 group. In addition, Cohen's d score in the delayed posttest is 9.63, which is a considerable effect size. This can be interpreted as the experimental 1 group maintaining solid results over time by implementing treatment (using ChatGPT within the learning process).

5. Discussion

The integration of artificial intelligence across several domains has rendered it essential for navigating the digital landscape of the 21st century. ChatGPT, an AI-driven system that has rapidly evolved within a brief timeframe, has emerged as one of the most significant innovations of the Industry 4.0 era, facilitating the globalization of education. It appears to continue being a focus area of interest for individuals from several disciplines, including education, both presently and in the future. The present study's findings further the inquiry into the applications of ChatGPT, specifically in educational contexts, by elucidating the opinions of school leaders and instructors regarding its initial incorporation into education (Çetin et al., 2024).

The present paper aimed to investigate the effect of using ChatGPT on the grammar improvements of EFL learners. To achieve the goal, 60 Omani EFL learners were randomly divided into three equal groups, with 20 students in each group. The control group used traditional in-class learning, while the experimental group 1 had the same in-class training but used ChatGPT as an extra facilitator in learning and receiving feedback on two grammatical structures, including simple past and past continuous. The third group, experimental 2, engaged in fully online teaching and learning plus using ChatGPT as the mentor for their learning process. After conducting the pretests, posttest, and delayed posttest for 5 weeks, the finding revealed that all the groups showed significant progress from pretests to posttests. However, comparing groups showed that the experimental 1 group, engaged in class and ChatGPT training, performed significantly better than the control and experimental group 2 in the posttest. The second rank for better performance belonged to experimental group 2, the fully online participants. In addition, the comparison of all the groups in the delayed posttest revealed that while students in experimental group 1 performed significantly

https://doi.org/10.22521/edupij.2024.134.2 Published online by Universitepark Press

better than the other two groups, the control group and experimental group 2 showed similar results, leading to decreased marks in the delayed posttest.

The decline in scores for the control and experimental 2 groups in the delayed posttest can be ascribed to various variables. The control group's initial progress in the posttest may have been due to the immediate retention of material acquired using traditional in-class procedures. However, without such repeated reinforcement and feedback, the learned information could have gradually worn off and given way to a lower performance in the delayed posttest. The lag in academic performance evident for experimental group 2, which was limited to online learning through ChatGPT, is thus explained through loss of face-to-face interaction and motivation/engagement problems in a completely virtual environment. Although the students initially benefited from the guidance of ChatGPT, not having a more controlled learning environment could be the reason for the decrease in performance over time and also result in the same outcomes as the control group's performance on the delayed posttest.

It is related that experimental group 1 is outstandingly superior in both the posttest and the delayed posttest, for which the supplementary help from ChatGPT supplements the conventional in-class learning of students. In this hybrid way, students could get direct teacher instructions, interactions with peers, and personalized feedback and reinforcement provided by ChatGPT. Grammatical structure internalization and improvement of retention and understanding were more accessible because of ChatGPT. The ongoing feedback and support offered by ChatGPT could have contributed to consolidating its knowledge and reducing its vulnerability to deterioration over time. Combining traditional classroom instruction with modern technological support resulted in a more comprehensive learning environment for experimental group 1.

The study results are consistent with those findings by Phieanchang (2024), who found that ChatGPT had the potential to be a dynamic, AI-driven tool for enhancing English grammatical competence. It provided students with a prompt-based learning environment, immediate feedback, and customized tasks, all of which may lead to quantifiable improvements in grammar proficiency. In another study with similar results, Karataş et al. (2024) examined the advantages and disadvantages of using ChatGPT in language classes by looking at the learners' opinions of the benefits and downsides of using ChatGPT. The investigators found that ChatGPT improved learners' engagement and motivation by being adaptable and readily available in various learning activities. It also positively impacted how students learn, particularly in writing, grammar, and vocabulary development.

In a similar study, Wei (2023) looked at how AI-assisted language learning instruments affected EFL learners' self-regulated learning, L2 encouragement, and English learning success. The findings demonstrated that, compared to the control group, the treatment group had much better accomplishment in grammar, vocabulary, reading skills, and writing abilities across all domains of English learning. Similarly, Song and Song (2023) assessed how ChatGPT, an AI-assisted language learning tool, improved Chinese language learners' writing abilities and enthusiasm. The study's findings show that learners with AI-assisted education significantly outperformed pupils in the control group regarding writing abilities and motivation. To be more precise, the treatment group demonstrated improved writing skills in terms of organization, coherence, syntax, and vocabulary.

In another study, Nguyen et al. (2024) stated that although ChatGPT provides several advantages for students, it also poses certain obstacles that require thorough examination. A significant problem is the possibility of pupils being too reliant on technology for information retrieval and question resolution instead of participating in autonomous reasoning and understanding. It was revealed that 83% of questioned students perceived that excessive dependence on technology hinders their capacity to handle problems autonomously. Furthermore, 76% of participants reported that the improper use of ChatGPT obstructs the cultivation of communication, critical thinking, and discourse

https://doi.org/10.22521/edupij.2024.134.2 Published online by Universitepark Press

skills, resulting in a more passive learning style. As a result, 56% of students said that this reliance diminished their ability to perform independent research, adversely impacting their creative thinking and self-directed learning and complicating their capacity to assess material critically

6. Conclusion

ChatGPT facilitates language acquisition by emulating genuine encounters. The system could determine the significance of a term within a given context, rectify and elucidate language errors, generate texts in different styles such as emails, stories, and recipes, construct quizzes, provide annotations for texts, and furnish glossaries, sample clauses, and interpretations (Kohnke et al., 2023). This study measured the effect of using ChatGPT as the learning facilitator to improve Omani EFL students' grammatical knowledge. The study's results revealed the positive impact of ChatGPT on learners' grammatical points. The group that received in-class instructions engaged with ChatGPT to accomplish the tasks and receive feedback performed significantly better than the other two groups.

The findings of the study provide notable insights for teachers and students. Integrating ChatGPT offers a multitude of advantages for both educators and learners. Teachers benefit from better instructional support, which includes individualized feedback and time-saving grading features. This allows them to allocate more attention to other aspects of teaching. ChatGPT is a valuable tool for enhancing teaching and supporting online learning. Taktak et al. (2024) indicated that instructors deemed the potential of ChatGPT to offer continuous feedback to educational practitioners significant. This feedback enables educators and learners to enhance their writing abilities following their learning rates. Moreover, ChatGPT's capabilities, including linguistic proficiency and topic diversity, can assist students in generating writing across several languages and diverse subject matters. This can significantly conserve instructors' time, enabling them to focus more on direct interaction with their pupils. AI offers educators considerable ease for lesson planning, material and activity preparation, and the generation of exam and test questions. Artificial intelligence can facilitate collaborative learning in educational settings, allowing instructors to create and disseminate texts for group activities. ChatGPT provides educators with enhanced opportunities for engagement and collaboration.

AI technology provides students with a customized learning experience that includes instant feedback, leading to higher engagement and motivation. Furthermore, it offers students the advantage of versatility in learning, enabling them to obtain guidance at any moment. This, in turn, improves their comprehension and memory of grammatical concepts.

This study confronted several limitations that impacted its findings' generalization and scope. The sample consisted of a group of 60 intermediate EFL learners from a single higher education institution in Oman and thus is not representative of the more fabulous student body nor the varying levels of competence across Oman. The five-week duration of the study limited its scope to investigate the long-term effects of ChatGPT, mainly since it focused only on simple past and past continuous grammatical structures. The quantitative nature of the research also narrowed its scope to investigate other relevant features, such as motivation, attitudes, and technological literacy of both students and instructors. The inability to control cognitive attributes, such as gender, further narrowed the study, with possible ramifications not being explored.

Future research can also examine the role of ChatGPT in collaborative learning environments, such as in pairs or groups, to further explain how it enhances learner interaction. Research may also explore the integration of ChatGPT into formative assessments to deliver immediate feedback and improve individualized learning. Moreover, investigation into the use of ChatGPT for English teaching and learning in various fields of study, such as ESP in medical or technical contexts, would be precious. Other exciting areas of future research include investigations into the potential of adaptive AI systems

https://doi.org/10.22521/edupij.2024.134.2 Published online by Universitepark Press

to personalize each learner's information and determine the ethical implications for ChatGPT in assessment methods.

Declarations

Author Contributions. Both authors contributed equally to this research study in drafting, analyzing the data, modifying, and proofreading.

Conflicts of Interest. The authors declare no conflict of interest.

Funding. This research received no funding.

Ethical Approval: Prior to the implementation of the study, approval was taken from the university's authorities.

Data Availability Statement. Data is available by the corresponding author upon official request.

References

Adıgüzel, T., Kaya, M. H., & Cansu, F. K. (2023). Revolutionizing education with AI: Exploring the transformative potential of ChatGPT. *Contemporary Educational Technology*, *15*(3). https://doi.org/10.30935/cedtech/13152

Ahmadi, D. M. R. (2018). The use of technology in English language learning: a literature review. *International Journal of Research in English Education*, *3*(2), 115–125. https://doi.org/10.29252/ijree.3.2.115

Balyen, L., & Peto, T. (2019). Promising artificial intelligence-machine learning-deep learning algorithms in ophthalmology. *Asia-Pacific Journal of Ophthalmology (Phila)*, 8(3), 264-272. https://doi.org/10.1097/01.APO.0000586388.81551.d0

Baskara, R., & Mukarto, M. (2023). Exploring the implications of ChatGPT for language learning in higher education. *Indonesian Journal of English Language Teaching and Applied Linguistics, 7*(2), 343-358. http://dx.doi.org/10.21093/ijeltal.v7i2.1387

Behforouz, B., & Al Ghaithi, A. (2024). The effectiveness of an interactive WhatsApp bot on listening skills. *International Journal of Interactive Mobile Technologies*, *18*(2), 82–94. https://doi.org///doi.org/10.3991/ijim.v18i02.44327

Bruner, J. S. (1966). *Toward a theory of instruction.* Harvard University Press.

Çetin, Y., Taş, Ö., Alakuş, H., & Kaplan, H. İ. (2024). Examining school principals' and teachers' perceptions of using ChatGPT in education. *Educational Process: International Journal, 13*(3), 85–96. https://doi.org/10.22521/edupij.2024.133.5

Chan, C. K. Y., & Lee, K. K. W. (2023). The AI generation gap: Are Gen Z students more interested in adopting generative AI such as ChatGPT in teaching and learning than their Gen X and millennial generation teachers? *Smart Learning Environments*, *10*(1), 60. https://doi.org/10.1186/s40561-023-00269-3

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

Chun, D., Kern, R., & Smith, B. (2016). Technology in language use, language teaching, and language learning. *The Modern Language Journal*, *100*(S1), 64–80. https://doi.org/10.1111/modl.12302

Dai, Y., Liu, A., & Lim, C. P. (2023). Reconceptualizing ChatGPT and generative AI as a student-driven innovation in higher education. *Procedia CIRP*, *119*, 84–90. https://doi.org/10.1016/j.procir.2023.05.002

Divekar, R. R., Drozdal, J., Chabot, S., Zhou, Y., Su, H., Chen, Y., Zhu, H., Hendler, J. A., & Braasch, J. (2022). Foreign language acquisition via artificial intelligence and extended reality: design and evaluation. *Computer Assisted Language Learning*, *35*(9), 2332–2360.

https://doi.org/10.1080/09588221.2021.1879162
Farrokhnia, M., Banihashem, S. K., Noroozi, O., & Wals, A. (2024). A SWOT analysis of ChatGPT: Implications for educational practice and research. *Innovations in Education and Teaching International*, *61*(3), 460–474. https://doi.org/10.1080/14703297.2023.2195846
Fathi, J., & Rahimi, M. (2024). Electronic writing portfolio in a collaborative writing environment: Its impact on EFL students' writing performance. *Computer Assisted Language Learning*, *37*(7), 1659-1697. https://doi.org/10.1080/09588221.2022.2097697
Gimpel, H., Hall, K., Decker, S., Eymann, T., Lämmermann, L., Mädche, A., Röglinger, M., Ruiner, C., Schoch, M., Schoop, M., Urbach, N., & Vandrik, S. (2023). *Unlocking the power of generative AI models and systems such as GPT-4 and ChatGPT for higher education: a guide for students and lecturers* (Working Paper 02–2023). Hohenheim Discussion Papers in Business, Economics and Social Sciences.
Hong, W. C. H. (2023). The impact of ChatGPT on foreign language teaching and learning: Opportunities in education and research. *Journal of Educational Technology and Innovation*, *5*(1), 37–45. https://doi.org/10.61414/jeti.v5i1.103
Hsu, T.-C., Chang, C., & Jen, T.-H. (2023). Artificial Intelligence image recognition using self-regulation learning strategies: Effects on vocabulary acquisition, learning anxiety, and learning behaviours of English language learners. *Interactive Learning Environments*, 1–19. https://doi.org/10.1080/10494820.2023.2165508
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.
Ivanov, S., & Soliman, M. (2023). Game of algorithms: ChatGPT implications for the future of tourism education and research. *Journal of Tourism Futures*, *9*(2), 214–221. https://doi.org/10.1108/JTF-02-2023-0038
Junaidi, J. (2020). Artificial intelligence in EFL context: rising students' speaking performance with Lyra virtual assistance. *International Journal of Advanced Science and Technology Rehabilitation*, *29*(5), 6735–6741.
Karataş, F., Abedi, F. Y., Ozek Gunyel, F., Karadeniz, D., & Kuzgun, Y. (2024). Incorporating AI in foreign language education: An investigation into ChatGPT's effect on foreign language learners. *Education and Information Technologies*, *29*(15), 19343-19366. https://doi.org/10.1007/s10639-024-12574-6
Knox, J. (2020). Artificial intelligence and education in China. *Learning, Media and Technology*, *45*(3), 298–311. https://doi.org/10.1080/17439884.2020.1754236
Kohnke, L., Moorhouse, B. L., & Zou, D. (2023). ChatGPT for language teaching and learning. *RELC Journal*, *54*(2), 537–550. https://doi.org/10.1177/00336882231162868
Lai, Y., Saab, N., & Admiraal, W. (2022). University students' use of mobile technology in self-directed language learning: Using the integrative model of behavior prediction. *Computers & Education*, *179*, 104413. https://doi.org/10.1016/j.compedu.2021.104413
Lantolf, J. P., & Thorne, S. L. (2006). *Sociocultural theory and the genesis of second language development.* Oxford University Press.
Lei, X., Fathi, J., Noorbakhsh, S., & Rahimi, M. (2022). The impact of mobile-assisted language learning on English as a foreign language learners' vocabulary learning attitudes and self-regulatory capacity. *Frontiers in Psychology*, *13*, 872922. https://doi.org/10.3389/fpsyg.2022.872922
Lewis, M. (1993). *The lexical approach: The state of ELT and a way forward.* Language Teaching Publications.
Lo, C. K. (2023). What is the impact of ChatGPT on education? A rapid review of the literature. *Education Sciences*, *13*(4), 410. https://doi.org/10.3390/educsci13040410
Loncar, M., Schams, W., & Liang, J.-S. (2023). Multiple technologies, multiple sources: Trends and analyses of the literature on technology-mediated feedback for L2 English writing published

from 2015-2019. *Computer Assisted Language Learning*, *36*(4), 722–784. https://doi.org/10.1080/09588221.2021.1943452

Lu, X. (2018). Natural Language Processing and Intelligent Computer-Assisted Language Learning (ICALL). In J. I. Liontas (Ed.), *The TESOL encyclopedia of English language teaching* (1st ed., pp. 1–6). Wiley. https://doi.org/10.1002/9781118784235.eelt0422

Malinka, K., Peresíni, M., Firc, A., Hujnák, O., & Janus, F. (2023). On the educational impact of ChatGPT: is artificial intelligence ready to obtain a university degree? *Proceedings of the 2023 Conference on Innovation and Technology in Computer Science Education V. 1*, 47–53. https://doi.org/10.1145/3587102.3588827

Nguyen, L. Q., & Le, H. V. (2023). Enhancing L2 learners' lexical gains via Quizlet learning tool: The role of individual differences. *Education and Information Technologies*, *28*(9), 12143–12167. https://doi.org/10.1007/s10639-023-11673-0

Nguyen, T. N. T., Lai, N. V., & Nguyen, Q. T. (2024). Artificial intelligence (AI) in education: a case study on ChatGPT's influence on student learning behaviors. *Educational Process: International Journal, 13*(2), 105–121. https://doi.org/10.22521/edupij.2024.132.7

Ouyang, F., & Jiao, P. (2021). Artificial intelligence in education: the three paradigms. *Computers and Education: Artificial Intelligence*, *2*, 100020. https://doi.org/10.1016/j.caeai.2021.100020

Paas, F., Renkl, A., & Sweller, J. (2003). Cognitive load theory and instructional design: Recent developments. *Educational Psychologist,* 38(1), 1-4. https://doi.org/10.1207/s15326985ep3801_1

Phieanchang, T. (2024). Using ChatGPT to improve English grammar skills for EFL learners. *The Journal of Dhonburi Rajabhat University*, *18*(1), 208–224.

Pikhart, M. (2020). Intelligent information processing for language education: the use of artificial intelligence in language learning apps. *Procedia Computer Science*, *176*, 1412–1419. https://doi.org/10.1016/j.procs.2020.09.151

Rahman, M. M., & Watanobe, Y. (2023). ChatGPT for education and research: Opportunities, threats, and strategies. *Applied Sciences*, *13*(9), 5783. https://doi.org/10.3390/app13095783

Rodinadze, S., & Zarbazoia, K. (2012). The advantages of information technology in teaching English language. *Frontiers of Language and Teaching*, *3*(5), 271–275.

Roll, I., & Wylie, R. (2016). Evolution and revolution in Artificial Intelligence in education. *International Journal of Artificial Intelligence in Education*, *26*(2), 582–599. https://doi.org/10.1007/s40593-016-0110-3

Shadiev, R., Wen, Y., Uosaki, N., & Song, Y. (2023). Future language learning with emerging technologies. *Journal of Computers in Education*, *10*(3), 463–467. https://doi.org/10.1007/s40692-023-00285-9

Shadiev, R., & Yang, M. (2020). Review of studies on technology-enhanced language learning and teaching. *Sustainability*, *12*(2), 524. https://doi.org/10.3390/su12020524

Shatri, Z. G. (2020). Advantages and disadvantages of using information technology in learning process of students. *Journal of Turkish Science Education*, *17*(3), 420–428. https://doi.org/10.36681/tused.2020.36

Skinner, B. F. (1957). *Verbal behavior.* Appleton-Century-Crofts.

Soleimani, H., Mohammaddokht, F., & Fathi, J. (2022). Exploring the effect of assisted repeated reading on incidental vocabulary learning and vocabulary learning self-efficacy in an EFL context. *Frontiers in Psychology*, *13*, 851812. https://doi.org/10.3389/fpsyg.2022.851812

Song, C., & Song, Y. (2023). Enhancing academic writing skills and motivation: Assessing the efficacy of ChatGPT in AI-assisted language learning for EFL students. *Frontiers in Psychology*, *14*, 1260843. https://doi.org/10.3389/fpsyg.2023.1260843

Su, Y., Lin, Y., & Lai, C. (2023). Collaborating with ChatGPT in argumentative writing classrooms. *Assessing Writing*, *57*, 100752. https://doi.org/10.1016/j.asw.2023.100752

Taktak, M., Bellibaş, M. Ş., & Özgenel, M. (2024). Use of ChatGPT in education: future strategic road map with SWOT analysis. *Educational Process: International Journal, 13*(3), 7–21. https://doi.org/10.22521/edupij.2024.133.1

Tafazoli, D., María, E. G., & Abril, C. A. H. (2019). Intelligent language tutoring system: Integrating intelligent computer-assisted language learning into language education. *International Journal of Information and Communication Technology Education (IJICTE)*, *15*(3), 60–74. https://doi.org/10.4018/IJICTE.2019070105

Wei, L. (2023). Artificial intelligence in language instruction: impact on English learning achievement, L2 motivation, and self-regulated learning. *Frontiers in Psychology*, *14*, 1261955. https://doi.org/10.3389/fpsyg.2023.1261955

Xu, X., Dugdale, D. M., Wei, X., & Mi, W. (2023). Leveraging Artificial Intelligence to predict young learner online learning engagement. *American Journal of Distance Education*, *37*(3), 185–198. https://doi.org/10.1080/08923647.2022.2044663

Yan, D. (2023). Impact of ChatGPT on learners in a L2 writing practicum: an exploratory investigation. *Education and Information Technologies*, *28*(11), 13943–13967. https://doi.org/10.1007/s10639-023-11742-4

Publisher's Note: Universitepark Limited remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.