



The Impact of ChatGPT on EFL Learners' Writing Performance

Marwa Muhammad Ahmad

University of Al-Hamdaniya,
IRAQ

Aram George Simon

University of Al-Hamdaniya,
IRAQ

Sarah A. Khuder

University of Al-Hamdaniya,
IRAQ

Ali Hussein Hazem*

University of Al-Hamdaniya,
IRAQ

Mohanad Ramadhan Safar

University of Al-Hamdaniya,
IRAQ

Article Info

Article history:

Received: June 3, 2026

Revised: September 13, 2026

Accepted: September 20, 2026

Keywords:

Academic writing Criteria;
Artificial Intelligence Tools;
ChatGPT;
EFL learner;
Writing skill.

Abstract

With the rapid development of AI technologies, increasing interest has emerged in their ability to support language learning, especially writing. Therefore, this study investigates the effect of using Artificial Intelligence tools, specifically ChatGPT, on EFL learners' writing skills. Through a mixed-method approach involving written tests and a questionnaire, the study examines how ChatGPT can contribute to improving EFL students' writing skills. Data were gathered through a questionnaire, a pre-test, and a post-test. Forty-five EFL learners participated in the questionnaire, while twenty contributed in the pre-test and post-test stages. The participants were third-year students in the Department of English, College of Education for Humanities, at Al-Hamdaniya University. The results indicate significant improvements in students' writing performance across all measured writing criteria following the ChatGPT-assisted writing activities. The findings also demonstrate that students had positive opinions about using ChatGPT to develop their English writing abilities. However, they reported various difficulties when using ChatGPT as a writing support tool. The study indicates that ChatGPT may serve as a helpful tool for EFL learners' academic writing development, while emphasizing the important roles of teachers and learners' independent learning.

To cite this article: Ahmad, M. M., Simon, A. G., Khuder, S. A., Hazem, A. H., & Safar, M. R. (2026). The Impact of ChatGPT on EFL learners' writing performance. *Online Learning in Educational Research*, 6(3), 149-158. <https://doi.org/10.58524/oler.v6i3.1344>

INTRODUCTION

The quickly developing technologies such as artificial intelligence (AI) have greatly influenced many aspects of society. Recent research has highlighted the growing role of generative AI in education, particularly its potential to support personalized learning, language practice, and feedback provision (Kasneci et al., 2023; Lo et al., 2024). One such important aspect that has been significantly affected by technology is education and its convergence with AI tools. In present-day education, there's a crucial transformation taking place as technology, and particularly the use of AI tools, is changing the traditional teacher-centered method of learning towards a more learner-centered way (Lo et al., 2024; Warschauer & Healey, 1998). Traditional ways of instruction, while crucial, can have their own drawbacks, such as being time-consuming and not always offering instant, individualized feedback.

Academic writing is an essential component of language learning because it enables students to communicate ideas, demonstrate their understanding, and fulfil academic requirements. For EFL learners, writing development requires attention not only to grammatical accuracy and vocabulary

* Corresponding Author

Ali Hussein Hazem, University of Al-Hamdaniya, IRAQ ✉ alihussein@uohamdaniya.edu.iq

but also to the organization and communication of ideas, making sustained feedback and revision important components of writing instruction (Kohnke et al., 2023; Mahapatra, 2024). One can say that Academic writing is considered one of the most critical and demanding skills to learn, requiring competence in varied skills such as organization and writing style, grammar, and lexicon (Campbell, 2019). Indeed, strong writing capabilities for students can serve their purpose to successfully express themselves clearly and eventually accomplish academic success across many professional sectors (Yoon, 2011). In the last few years, there has been an increasing use of technology in language learning contexts to overcome some of the challenges that EFL learners face while learning a foreign language, specifically when they learn how to write properly (Valijärvi & Tarsoly, 2019).

Learning to write in English can be somewhat difficult for EFL learners for many reasons such as insufficient lexical knowledge to enable them to write meaningfully, time limitations constraints that hinders their writing improvement efforts, grammatical inaccuracy or the lack of confidence in expressing their ideas clearly (Eckstein & Bell, 2023; Fenjan, 2024; Gabrielatos, 2002; Hazem et al., 2026; Lu et al. 2022; Wolfersberger, 2003; Zhang & Zhang, 2023; Zhang et al. 2022). Thus, now with the development of Artificial Intelligence with ChatGPT as a writing assistance tool, the possibility to address these challenges. AI-based tools, particularly ChatGPT, have introduced new possibilities for language learning by supporting idea generation, language revision, feedback, and writing development (Zawacki-Richter et al., 2019; Mahlow, 2023). However, the extent to which this use can in fact lead to measurable improvements in EFL learners' writing ability in Iraq is still an underexplored area of empirical investigation.

Previous studies have established that ChatGPT can help writing development through idea production, instant feedback, and improvements in certain linguistic areas. Nevertheless, worries exist in relation to inaccuracy, overreliance, and the need for teacher intervention (Barrot, 2023; Kostka & Toncelli, 2023; Kucuk, 2024; Mugableh, 2024; Mahapatra, 2024, Algaraady & Mahyoob, 2023; Tack & Piech, 2022). Although previous studies have highlighted the potential of ChatGPT to support EFL learners through immediate feedback and error detection, limited attention has been given to objectively measuring improvements across specific writing criteria. Moreover, research examining learners' perceptions alongside changes in specific writing criteria can provide a more comprehensive understanding of both the potential benefits and practical limitations of ChatGPT-assisted writing instruction (Teng, 2024; Teng & Huang, 2026). Much of the existing research has focused on learners' perceptions and the capabilities of AI tools rather than measurable changes in writing performance. Therefore, this study investigates the influence of ChatGPT on EFL learners' writing ability in terms of grammatical accuracy, lexical knowledge, cohesion, coherence, and overall writing quality, while also examining learners' perceptions of its usefulness.

The present study seeks to explore the efficacy of employing AI tools, specifically ChatGPT, in developing EFL learners' writing skills. It also aims to examine whether using AI tools, specifically ChatGPT, can lead to measurable enhancement in certain aspects of their writing skills, which are grammatical accuracy, lexical knowledge, cohesion and coherence and overall writing quality. It also aims to examine learners' own perceptions about the usefulness of AI tools in developing their writing ability in a foreign language. This study hypothesizes that EFL learners who use AI tools in their writing will show a statistically significant improvement in their writing performance after the use of. It also hypothesizes that EFL learners will show positive perceptions with regard to the usefulness of using AI tools in writing.

METHOD

Research Design

This study follows a mixed-methods research approach; the quantitative component employed a pre-experimental one-group pretest-posttest design to examine changes in learners' writing performance before and after the use of ChatGPT. A questionnaire was administered to explore EFL learners' views of the usage and usefulness of ChatGPT. The questionnaire included both closed-ended items, which provided quantitative descriptive data, and open-ended questions, which offered qualitative insights into students' experiences and challenges when using ChatGPT for writing. Greene et al. (1989) and Zhou et al. (2024) have examined several studies employing a mixed-method approach and have asserted that integrating the two methodologies is beneficial for

developing comprehensive accounts and addressing a broader range of research concerns. Furthermore, Tashakkori and Teddlie (2003) assert that mixed methods may provide "approaches to addressing research questions that cannot be answered through any other means." Thus, the present study seeks to provide both quantitative evidence of the function of AI tools for improving writing ability for students and a qualitative view into students' experiences.

Population and Sample Size

Forty-five EFL learners were selected in the study; they are third-year students in the Department of English, College of Education for Humanities at Al-Hamdaniya University. The participants represented the total sample from which data were collected. Nevertheless, because of the practical requirements of conducting the pre-test and post-test assessments. That is to say, the ability to have access to only twenty participants to go through the pre-test and post-test phases. Thus, only twenty participants finished the full pre-test/post-test process and were, as a result, incorporated in the analysis of writing performance.

In comparison, the overall 45 participants contributed to the questionnaire part of the study. Despite their approximately similar proficiency level since they have had similar educational backgrounds, the participants were selected using convenience sampling. This technique of sampling is used because the participants are easily accessible to the researcher within the educational context. In addition, certain demographic information such as age and gender are also considered to provide context.

Data Collection and Analysis

The study adopts two main research instruments, namely, a pre- test and post- test to collect written texts from the participants at different stages of the study to analyze improvements in writing before and after the use of the AI tools and a questionnaire to explore students' perceptions of the use of the tool in enhancing their writing ability in English. First, twenty selected EFL learners were asked to write an essay about a certain topic in a pre-test phase with no recourse to the use of ChatGPT. Two months later, ChatGPT was incorporated. The ChatGPT intervention was conducted over 8 sessions over the two months, two sessions per week, and each session lasted about 45–60 minutes. Throughout the intervention, participants completed diverse writing tasks, particularly focusing on task development, vocabulary choice, grammatical accuracy, cohesion, and coherence. Participants were given some guided prompts and were instructed to construct their own initial drafts and were not permitted to submit complete ChatGPT-generated texts. ChatGPT was used mainly for feedback, clarification, revision, and suggestions for improvement. The role of the instructor was a facilitator: presenting the writing tasks, showing appropriate prompting strategies, clarifying struggles, and encouraging participants to assess AI-generated responses critically. Second, a questionnaire was conducted and distributed to forty-five EFL students to help the researcher understand students' perceptions about the topic under study.

RESULTS AND DISCUSSION

The Pre-test and Post-test Results and Analysis

In order to assess the potential development in learners' writing proficiency, a pre-test was administered to twenty EFL learners before an eight-week ChatGPT intervention, in which they were given an essay about a particular topic to write about. After those two months, they were asked to write another essay with the help of ChatGPT in a post-test phase. In both tests, students were asked to write an essay of about 250–300 words within 60 minutes. The tests were conducted under controlled classroom conditions, and all participants were required to finish the task independently and with no help from any reference material.

The participants' written essays were evaluated using the IELTS Writing Band Descriptors (2023). Each essay was assessed according to four analytical criteria: Task Response, Coherence and Cohesion, Lexical Resource, and Grammatical Range and Accuracy. Each criterion was assigned a band score ranging from 0 to 9. The four criterion scores were then averaged to attain an overall writing score for each participant. The same scoring procedure was applied to the pre-test and post-test essays. The pre-test and post-test scores were compared to examine changes in students' writing

performance following the ChatGPT-assisted writing activities. For the purpose of comparing pre-test scores with post-test scores and testing for an increase in writing performance after using ChatGPT, paired t-tests were conducted. To evaluate students' writing performance consistently, the IELTS (2023) Writing Band Descriptors were used. The scoring rubric and descriptions of the four assessment criteria are presented in Table 1.

Table 1. IELTS Writing Scoring Rubric

IELTS scoring criteria	Description of criteria	Scoring range
Task Response	Measures how well the learner addresses the task, presents main ideas, supports them with evidence, and meets the word limit.	0–9
Coherence and cohesion	Assesses logical organization, paragraphing, flow of ideas, and appropriate use of linking devices.	0–9
Lexical Resource	Evaluates range, accuracy, appropriacy, and flexibility of vocabulary, including use of less common expressions and collocations.	0–9
Grammatical Range and Accuracy	Measures variety and correctness of sentence structures, tense agreement, punctuation, and grammar control.	0–9

Table 2 presents the descriptive statistics and paired-samples t-test results for students' pre-test and post-test writing performance across the four assessment criteria.

Table 2. Pre-test and Post-test Writing Performance and Paired-Samples t-test Results

Criterion	Pre-test M (SD)	Post-test M (SD)	t(19)	p	Cohen's d	95% CI
Task Response	5.70 (0.83)	6.48 (0.53)	4.507	.0002	1.008	0.415–1.135
Lexical Resource	5.48 (0.80)	6.60 (0.64)	5.772	.000015	1.291	0.717–1.533
Coherence and Cohesion	5.55 (0.79)	6.55 (0.71)	5.305	.00004	1.186	0.605–1.395
Grammatical Range and Accuracy	5.50 (0.81)	6.98 (0.68)	7.903	.0000002	1.767	1.084–1.866

The paired-samples t-test results show statistically significant progress in writing skills for students for all criteria examined: task response, lexical resource, cohesion and coherence and grammatical accuracy. The mean score for task response increased from 5.70 in the pre-test to 6.48 in the post-test, with the SD decreasing from 0.83 to 0.53. The mean scores for lexical resource increased from 5.48 to 6.60, and the SD decreased from 0.80 to 0.64. As for the mean scores of cohesion and coherence, they also increased from 5.55 to 6.55, with a decreasing SD from 0.79 to 0.71. Finally, the mean score of grammatical accuracy increased from 5.50 to 6.98, with a decreasing SD from 0.81 to 0.68. Such a significant increase in mean scores as well as a significant decrease in SD scores has certain implications. First, it shows an overall improvement in the students' writing performance. The results showed statistically significant improvements in students' writing scores in all four criteria following the ChatGPT-enhanced writing activities. However, the enhancement should not be mainly credited to ChatGPT due to the lack of a control group in this study. Second, the clear decrease in SD scores suggests a possibility of reduced score dispersion, which points to the fact that students' writing became more uniform. All the confidence intervals are positive, with the results of the post-test after ChatGPT being higher than the pre-test results. The largest effect size across all the assessed criteria was found in grammatical range and accuracy.

The research questionnaire constructed for this study was meant to gather information focus on the impact of learners' perceptions and experiences on their Writing performance with ChatGPT. The questionnaire was formulated by the researchers according to the research goals and the review of the literature. The demographic information of the 45 students who participated in the questionnaire was presented prior to exploring their perceptions and experiences. The students' age and gender characteristics are displayed in Table 3.

Table 3. Demographic Characteristics of the 45 Participants

Variable	Category	Percentage
Age	20-25	64.4%
	25-30	22.2%
	30-35	13.3%
Gender	Male	44.4%
	Female	55.6 %

Participants' Perceptions and Experiences Related to English Writing

Section two of the questionnaire examined participants' perceptions and experiences related to English writing, including the perceived importance of writing, writing practice, self-assessed proficiency, and major writing challenges. The results are presented in Table 4.

Table 4. Participants' Perceptions and Experiences Related to English Writing

Aspect	Response	n	%
Importance of English writing	Not important	1	2.2
	Slightly important	2	4.4
	Moderately important	6	13.3
	Very important	32	71.1
	Extremely important	4	8.9
Importance of writing practice	Yes	45	100.0
	No	0	0.0
Frequency of writing practice	Always	4	8.9
	Often	6	13.3
	Sometimes	31	68.9
	Rarely	3	6.7
	Never	1	2.2
Self-assessed writing proficiency	Beginner	5	11.1
	Intermediate	32	71.1
	Advanced	7	15.6
	Proficient	1	2.2
Main writing challenge	Grammar	12	26.7
	Spelling	6	13.3
	Punctuation	3	6.7
	Vocabulary	16	35.6
	Cohesion and coherence	8	17.8

Note. $N = 45$.

Item 2 in the questionnaire revealed that the participants found writing to be an important skill. As seen in table 4, the vast majority found it important (very important 71.1%; extremely important 8.9%); and the remaining found it to be fairly important (13.3%); slightly important (4.4%); and not at all important (2.2%). Participants found practicing writing as important as well but not all participants used the same amount of time to practice it. Slightly more than half of them wrote sometimes (68.9%), while a few wrote always (8.9%), often (13.3%), rarely (6.7%), and never (2.2%). The participants' self-assessment of their writing ability made up the largest proportion (71.1%) of intermediate writers. Only 15.6% of the participants' self-assessed their writing ability as advanced writers, and 2.2% perceived themselves as proficient in writing. The participants' perception on writing as well as their participation in writing practice cannot prevent them from having difficulties in some areas of writing. The most difficult area of writing was vocabulary which 35.6% reported having difficulty in it, and then was grammar (26.7%), cohesion and coherence (17.8%), spelling (13.3%) and punctuation (6.7%).

Participants' Use of AI Tools in English Writing

This part of the questionnaire explored participants' acquaintance with AI tools, its use for writing activities, the recurrence of use, and the main reasons for which ChatGPT was used. The results are demonstrated in Table 5.

Table 5. Participants' use of AI Tools in English Writing

Aspect	Response	n	%
Familiarity with AI tools	Yes	36	80.0
	No	9	20.0
Use of AI tools for writing assignments	Yes	32	71.1
	No	13	28.9
AI tools used for writing assignments	ChatGPT	25	78.1
	Grammarly	4	12.5
	QuillBot	0	0.0
	Other	3	9.4
	Always	2	4.4
Frequency of ChatGPT use	Often	7	15.6
	Sometimes	23	51.1
	Rarely	11	24.4
	Never	2	4.4
Main focus when using ChatGPT	Grammar and sentence structure	13	28.9
	Punctuation	2	4.4
	Spelling	3	6.7
	Vocabulary and word choice	13	28.9
	Cohesion and coherence	10	22.2
	Other	4	8.9

The questionnaire indicated that the majority of participants were familiar with AI tools and had previously used them in writing assignments. As shown in Table 5, 80.0% of the participants indicated that they were familiar with AI tools while 20.0% indicated that they were not. Similarly, 71.1% of the participants indicated that they had used AI tools to write the assignment whereas 28.9% indicated that they had not. Of the 32 participants who reported to have used AI tools, 78.1% reported ChatGPT to be the most popular AI tool while 12.5% reported using Grammarly and 9.4% others. No participant reported using Quill Bot.

In terms of ChatGPT specifically, there was a range of usage among the participants. The majority (51.1%) of them reported that they sometimes used ChatGPT, 24.4% rarely, 15.6% often, 4.4% always, and 4.4% never. For those that used ChatGPT when writing, the main aim was language use such as correct grammar and sentence structure (28.9%) and vocabulary and word choice (28.9%), but also cohesion and coherence (22.2%), spelling (6.7%), punctuation (4.4%) and various other purposes (8.9%). These results are relevant because they show how much the participants had used the tools, and for what purposes they had used them, and for the purposes of the writing tasks.

Students' Perceived Benefits and Challenges of Using ChatGPT

This part of the questionnaire inspected students' perceived progress after the use of ChatGPT and the obstacles the students faced as is shown in table 6.

Table 6. Students' Perceived Usefulness and Challenges in Using ChatGPT

Aspect	Response/Category	Frequency (n)	Percentage (%)
Perceived usefulness of using ChatGPT	Yes	38	84.4
	No	7	15.6
Perceived areas of development	Grammar and sentence structure	11	24.4
	Punctuation	5	11.1
	Spelling	4	8.9

	Vocabulary and word choice	16	35.6
	Cohesion and coherence	1	2.2
	Other	8	17.8
Perceived challenges when using ChatGPT	Yes	21	46.7
	No	24	53.3

Most students (84.4%, $n = 38$) perceived ChatGPT as useful for supporting their writing (see Table 6). The most frequently reported improvement was in vocabulary and word choice (35.6%), followed by grammar and sentence structure (24.4%). However, 46.7% of students reported experiencing challenges when using the tool. Responses to the open-ended Question 14 further revealed that these challenges included inaccurate or contextually inappropriate responses, oversimplified and overly general explanations, inconsistent answers, limited support for drafting and revising, and difficulties in using ChatGPT appropriately. These findings suggest that although students perceived ChatGPT as beneficial, its use still requires guidance to ensure contextual accuracy, deeper feedback, and support for the writing process. The open-ended responses indicated that students experienced challenges related to the accuracy, contextual appropriateness, consistency, and depth of ChatGPT-generated responses. Some students also reported that the tool provided greater support for final text production than for the drafting and revision processes.

Overall, the findings of the present study align with recent empirical research in indicating two outlines: first, the findings indicate that students' writing scores increased following the ChatGPT-assisted writing activities. However, the absence of a control group prevents a definitive conclusion regarding the causal effect of ChatGPT. This finding is consistent with Mahapatra's (2024) study. Second, EFL learners mostly see ChatGPT as a useful tool to support their writing process, which is consistent with recent empirical research such as Teng (2024). The current study shows a regular pattern of improvement in EFL students' writing ability across the different criteria that were tested, complemented by mostly positive learner perceptions of the use of ChatGPT. The results demonstrate a broad alignment with the latest empirical research displaying the potential of the use of an AI tool in improving writing performance in a second language, while also highlighting worries about accuracy, over-reliance, and the necessary involvement of human guidance (Barrot, 2023; Mahapatra, 2024; Teng, 2025). Thus, the current study contributes to the growing literature by indicating that ChatGPT may be useful across multiple criteria of EFL writing improvement when included in a structured learning process. However, because of the absence of a control group and the somewhat small number of students that contributed in the pre-test/post-test analysis, the results provide preliminary evidence of improvement but do not establish a causal effect of ChatGPT. The findings also support a guided and pedagogically coordinated incorporation of ChatGPT into EFL writing teaching. Teachers should enable learners to benefit from the advantages that AI-assisted tools such as ChatGPT can provide, such as instantaneous feedback and revision, while concurrently improving their independent learning ability and critical thinking (Barrot, 2023; Mahapatra, 2024; Teng, 2025). Teachers are still a priority since they can deliver contextualized pedagogical conclusions, recognize inappropriate suggestions, and observe students' learning practices. ChatGPT should therefore be considered as a complementary learning instrument rather than a replacement for teachers or for learners' own intellectual engagement.

LIMITATIONS

Some limitations should be noted, first, the study focused mainly on ChatGPT as the AI tool in supporting writing. Subsequently, the findings cannot be generalized to other AI tools. Second, only twenty participants of the overall sample contributed to the pre-test/post-test part of the study due to some practical requirements of conducting the pre-test and post-test assessment. Third, the questionnaire depended on students' self-reported perceptions and accordingly, positive perceptions should not be considered as direct evidence of actual improvement in learners' writing performance. Finally, the absence of a control group is also another methodological limitation since the current study adopted a one-group pre-test-post-test design.

CONCLUSION

This study examined changes in EFL students' writing performance following ChatGPT-assisted writing activities and explored their perceptions of ChatGPT. First, the paired-samples t-test results indicated statistically significant improvements in students' writing performance across all the assessment criteria: task response, lexical resource, cohesion and coherence, and grammatical range and accuracy. In all criteria, the post-test mean scores were higher than the pre-test mean scores. However, these improvements cannot be attributed exclusively to the use of ChatGPT, as other factors, such as classroom instruction, writing practice, and increased familiarity with the task, may have contributed to the results. Second, the questionnaire findings showed that among the participants, 71.1% reported using AI tools for writing assignments, and ChatGPT was the most reported tool among those users. The findings also indicated that students were concerned not only with the accuracy and clarity of their writing but also with textual organization and the logical flow of ideas.

Perceived usefulness Regarding usefulness, 84.4% of the participants stated that ChatGPT was useful to assist them in their writing. However, students highlighted issues such as excessive use, inaccurate and out-of-place answers, inconsistent output, and over-generalized explanations. Based on these results, it can be inferred that ChatGPT has the capacity to give real-time feedback and make some suggestions to help students improve their writing. Therefore, the use of AI tools cannot fully replace the essential role of educators in the learning process. Future studies should include larger samples from different EFL contexts and proficiency levels and compare the use of ChatGPT with other AI writing tools or traditional teacher-centered writing instruction.

AUTHOR CONTRIBUTIONS

AHH contributed to conceptualization, methodology, data collection, data curation, and writing the original draft. AGS contributed to formal analysis, validation, writing, review, and editing. MMA contributed to data collection and project administration. SAK contributed to supervision, validation, writing, review, and editing. MRS contributed to methodology, supervision, writing, review, and editing. All authors have read and accepted the final manuscript.

ACKNOWLEDGMENT

The authors of this paper would first like to thank all the EFL learners who have agreed to participate in this study for their sincere dedication to completing the questionnaire and the assignments the authors have given them. Additionally, special thanks are extended to earlier studies in the fields of artificial intelligence and English language learning domains that paved the way for the present study.

REFERENCES

- Algaraady, J., & Mahyoob, M. (2023). ChatGPT's capabilities in spotting and analyzing writing errors experienced by EFL learners. *Arab World English Journal, Special Issue on CALL*, 9, 3–17. <https://doi.org/10.24093/awej/call9.1>
- Barrot, J. S. (2023). Using ChatGPT for second language writing: Pitfalls and potentials. *Assessing Writing*, 57, 100745. <https://doi.org/10.1016/j.asw.2023.100745>
- Campbell, M. (2019). Teaching academic writing in higher education. *Educational Quarterly Reviews*, 2(3), 608–614. <https://doi.org/10.31014/aior.1993.02.03.92>
- Eckstein, G., & Bell, L. (2023). Dynamic written corrective feedback in first-year composition: Accuracy and lexical and syntactic complexity. *RELC Journal*, 54(3), 630–647. <https://doi.org/10.1177/00336882211061624>
- Fenjan, S. S. (2024). Investigating the grammatical and lexical coherence in essay writing by Iraqi EFL college students. *Journal of the College of Education for Humanities, University of Thi-Qar*, 14(2). <https://doi.org/10.32792/jedh.v14i2.462>
- Gabrielatos, C. (2002). *EFL writing: Product and process* (ERIC Document Reproduction Service No. ED476839). ERIC.

- Greene, J. C., Caracelli, V. J., & Graham, W. F. (1989). Toward a conceptual framework for mixed-method evaluation designs. *Educational Evaluation and Policy Analysis*, 11(3), 255–274. <https://doi.org/10.3102/01623737011003255>
- Hazem, A. H., Simon, A. G., Ahmed, M. M., Rashid, B. N., & Alnoori, B. S. M. (2026). Students' perceptions of using iPad applications to support EFL oral communication skills. *Online Learning in Educational Research*, 6(1), 99–106. <https://doi.org/10.58524/oler.v6i1.1052>
- 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). <https://doi.org/10.61414/jeti.v5i1.103>
- IELTS. (2023). *IELTS writing band descriptors*. British Council, IDP: IELTS Australia, & Cambridge Assessment English.
- Kasneci, E., Sessler, K., Küchemann, S., Bannert, M., Dementieva, D., Fischer, F., Gasser, U., Groh, G., Günemann, S., Hüllermeier, E., Krusche, S., Kutyniok, G., Michaeli, T., Nerdel, C., Pfeffer, J., Poquet, O., Sailer, M., Schmidt, A., Seidel, T., ... Kasneci, G. (2023). ChatGPT for good? On opportunities and challenges of large language models for education. *Learning and Individual Differences*, 103, Article 102274. <https://doi.org/10.1016/j.lindif.2023.102274>
- Kohnke, L., Moorhouse, B. L., & Zou, D. (2023). ChatGPT for language teaching and learning. *REL C Journal*, 54(2), 537–550. <https://doi.org/10.1177/00336882231162868>
- Kostka, I., & Toncelli, R. (2023). Exploring applications of ChatGPT to English language teaching: Opportunities, challenges, and recommendations. *TESL-EJ*, 27(3). <https://doi.org/10.55593/ej.27107int>
- Kucuk, T. (2024). ChatGPT integrated grammar teaching and learning in EFL classes: A study on Tishk International University students in Erbil, Iraq. *Arab World English Journal, Special Issue on ChatGPT*, 100–111. <https://doi.org/10.24093/awej/ChatGPT.6>
- Lo, C. K., Yu, P. L. H., Xu, S., Ng, D. T. K., & Jong, M. S. Y. (2024). Exploring the application of ChatGPT in ESL/EFL education and related research issues: A systematic review of empirical studies. *Smart Learning Environments*, 11, Article 50. <https://doi.org/10.1186/s40561-024-00342-5>
- Lu, X., Casal, J. E., & Liu, Y. (2022). Syntactic and lexical complexity in L2 English academic writing: Development and competition. *Ampersand*, 9, Article 100096. <https://doi.org/10.1016/j.amper.2022.100096>
- Mahapatra, S. (2024). Impact of ChatGPT on ESL students' academic writing skills: A mixed methods intervention study. *Smart Learning Environments*, 11, Article 9. <https://doi.org/10.1186/s40561-024-00295-9>
- Mahlow, C. (2023). Large language models and artificial intelligence, the end of (language) learning as we know it—or not quite? *EdArXiv*. <https://doi.org/10.35542/osf.io/da2rm>
- Mugableh, A. I. (2024). The impact of ChatGPT on the development of vocabulary knowledge of Saudi EFL students. *Arab World English Journal, Special Issue on ChatGPT*, 265–281. <https://doi.org/10.24093/awej/ChatGPT.18>
- Tack, A., & Piech, C. (2022). The AI teacher test: Measuring the pedagogical ability of Blender and GPT-3 in educational dialogues. *arXiv*.
- Tashakkori, A., & Teddlie, C. (2003). The past and the future of mixed model research: From methodological triangulation to mixed model designs. In A. Tashakkori & C. Teddlie (Eds.), *Handbook of mixed methods in social and behavioral research*. Sage.
- Teng, M. F. (2024). A systematic review of ChatGPT for English as a foreign language writing: Opportunities, challenges, and recommendations. *International Journal of TESOL Studies*, 6(3), 36–57. <https://doi.org/10.58304/ijts.20240304>
- Teng, M. F. (2025). Metacognitive awareness and EFL learners' perceptions and experiences in utilizing ChatGPT for writing feedback. *European Journal of Education*, 60(1), Article e12811. <https://doi.org/10.1111/ejed.12811>
- Teng, M. F., & Huang, J. Y. T. (2026). Assessing ChatGPT feedback for EFL learners' engagement and writing performance. *International Journal of Applied Linguistics*. Advance online publication. <https://doi.org/10.1111/ijal.70155>
- Valijärvi, R. L., & Tarsoly, E. (2019). Language students as critical users of Google Translate: Pitfalls and possibilities. *Practitioner Research in Higher Education*, 12(1), 61–74.

- Warschauer, M., & Healey, D. (1998). Computers and language learning: An overview. *Language Teaching*, 31(2), 57–71. <https://doi.org/10.1017/S0261444800012970>
- Wolfersberger, M. (2003). L1 to L2 writing process and strategy transfer: A look at lower proficiency writers. *TESL-EJ*, 7(2).
- Yoon, C. (2011). Concordancing in L2 writing class: An overview of research and issues. *Journal of English for Academic Purposes*, 10(3), 130–139. <https://doi.org/10.1016/j.jeap.2011.03.003>
- Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education—Where are the educators? *International Journal of Educational Technology in Higher Education*, 16, Article 39. <https://doi.org/10.1186/s41239-019-0171-0>
- Zhang, J., & Zhang, L. J. (2023). Lexical cohesion development in English as a foreign language learners' argumentative writing: A latent class growth model approach. *Linguistics and Education*, 78, Article 101255. <https://doi.org/10.1016/j.linged.2023.101255>
- Zhang, S., Zhang, H., & Zhang, C. (2022). A dynamic systems study on complexity, accuracy, and fluency in English writing development by Chinese university students. *Frontiers in Psychology*, 13, Article 787710. <https://doi.org/10.3389/fpsyg.2022.787710>
- Zhou, Y., Zhou, Y., & Machtmes, K. (2024). Mixed methods integration strategies used in education: A systematic review. *Methodological Innovations*, 17(1), 41–49. <https://doi.org/10.1177/20597991231217937>