

AI-Driven Feedback for Pedagogical Innovation: Assessing ChatGPT's Impact on Saudi EFL Learners' Writing Proficiency

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Abstract

The integration of artificial intelligence, especially ChatGPT, into EFL instruction represents significant pedagogical advancements. This study investigates the impact of ChatGPT feedback on the writing skills of Saudi EFL learners. A quasi-experimental design with experimental and control groups used pre- and post-writing assessments to evaluate improvements in vocabulary, grammar, content development, and organization. The sample comprised 60 students, divided into two equal groups: the experimental group received feedback from ChatGPT, while the control group relied on conventional teaching methods. Statistical analyses, including paired-samples and independent-samples t-tests, were conducted to assess the significance and magnitude of learning gains. Findings indicated that students who used ChatGPT demonstrated noteworthy improvements in their writing performance, particularly in vocabulary use, grammatical accuracy, content organization, and overall development of organization. These improvements were largely due to the immediate, clear feedback the AI tool provided. Furthermore, the study emphasizes the importance of teacher involvement in AI-supported writing instruction, suggesting its relevance to integrating digital learning tools in Saudi higher education, in line with national priorities for educational innovation and technology-enhanced learning.

Keywords: AI-driven feedback; digital transformation; grammatical accuracy; pedagogical innovation; noteworthy enhancements

1. Introduction

Mastering writing skills is a significant challenge for EFL/ESL learners due to the need for linguistic accuracy, vocabulary use, coherence, and cognitive abilities, impacting both learners and instructors (Alawerdy & Alalwi, 2022). Limited vocabulary, grammatical mistakes, and organizational issues often hinder the quality of their writing (Myles, 2002; Fareed et al., 2016; Mohammad & Hazarika, 2016). Writing requires precision and clarity, posing challenges for those with limited English exposure outside the classroom, whereas speaking can rely on contextual cues. Studies (Myles, 2002; Alharbi, 2019; Bolsunovskaya & Rymanova, 2020) show that EFL/ESL learners struggle with limited vocabulary, grammatical errors, and poor organization, which adversely affect their writing quality. Contributing factors include exam-oriented curricula, inadequate writing practice, and insufficient personalized feedback.

Feedback is crucial for improving writing skills, as it helps learners identify and avoid repeating mistakes. However, conventional teacher feedback is constrained by factors such as large class sizes, heavy workloads, and limited time for personal comments, leading to the provision of generic feedback or delayed responses, which diminishes revision effectiveness (Shafii & Berger, 2025). Automated writing evaluation (AWE) has been a subject of research for many years, focusing on its capability to provide prompt assessments of student writing. This technology aims to reduce educators' evaluation workload, making the writing assessment process more efficient (Wilson et al., 2022). These systems use natural language processing and artificial intelligence to assess written texts, enhancing student engagement, effectiveness, writing length, and overall quality. AWE systems have relied on extensive training using hundreds of essays targeted to specific prompts and on ongoing human feedback for calibration. This dependency comes with costs and constrains teachers' flexibility in employing these systems, as evaluations are restricted to the specific writing prompts utilized during training (Chen et al., 2022).

However, the incorporation of AI-powered tools into learning environments, especially in the context of foreign/second language (L2) instruction, has led to a significant paradigm shift, fundamentally transforming conventional pedagogies. This trend is fueled by the swift advancement of AI-assisted writing tools specifically designed to support students in their writing tasks (Gilbur, 2023; Jarrah et al., 2023). Modern generative AI, such as ChatGPT, operates differently from previous systems, being low-cost and easily accessible without requiring training on human corpora for specific tasks or genres (Steiss et al., 2024). This technology effectively generates contextually relevant text across diverse learning scenarios and offers immediate feedback (Polakova & Ivenz, 2024; Ba et al., 2025). It supports a student-centric approach by enabling instructors to tailor content and teaching strategies to individual student progress and preferences, enhancing student ownership, motivation, and academic performance (Bettayeb et al., 2024). Multiple studies (Marzuki et al., 2023;

Khalifa & Albadawy, 2024; Deep & Chen, 2025) reveal that AI-powered tools enhance EFL/ESL learners' writing skills. One AI tool, ChatGPT, offers real-time, personalized, and context-sensitive feedback, enabling students to ask questions and receive clarifications, thereby enhancing learner autonomy and engagement (Alhusaiyan, 2024; Jamshed et al., 2024; Fyka, 2024). ChatGPT in language education addresses conventional instructional constraints while offering an organized and efficient learning method, enhancing learning speed and adaptability, enabling personalized learning experiences, improving academic outcomes, and enhancing student engagement (Ayeni et al., 2024; Javaid et al., 2023; Al-Jahwari & Yousif, 2025). Optimized learning paths and resource allocation through customized instruction significantly enhance language learning, representing a key innovation in educational technology. ChatGPT contributes to language acquisition by creating engaging and dynamic learning environments.

1.1 Research Problem Statement

Vision 2030 emphasizes Saudi Arabia's rapid digital transformation, which fosters the adoption of educational technology, especially AI (Fraidan & Alaliwi, 2024; Asem et al., 2024). This development becomes particularly visible in EFL instruction. AI solutions like ChatGPT, Grammarly, and intelligent tutoring systems are transforming instruction, learning, and assessment. Conventional language instruction will get more efficient and customized with these resources. Recent studies reveal that AI tools like ChatGPT enhance EFL writing by improving quality, revision habits, and student motivation. They help improve grammatical accuracy, enhance vocabulary, promote organization, reduce anxiety, and foster independent learning. Nonetheless, gaps remain in robust theoretical frameworks, in the focus on short-term studies, and in comparisons with traditional feedback methods. Moreover, empirical evidence on ChatGPT's impact on writing proficiency and engagement is limited, particularly in the context of Saudi EFL higher education amidst ongoing digital transformation.

1.2 Research Purpose Statement

AI-assisted learning tools, such as ChatGPT, provide personalized support in language learning by generating feedback, suggesting vocabulary, and modeling sentence structures. This study explores the impact of ChatGPT integration on EFL learners' writing proficiency and its potential to enhance writing sub-skills, including vocabulary, grammar, content development, and organization.

2. Literature Review

2.1 Theoretical Framework

The integration of AI tools, especially ChatGPT, in English as a Foreign Language (EFL) classes is supported by multiple theoretical frameworks emphasizing interaction and engagement, negotiation, and perceived usefulness/perceived ease of use in language acquisition/learning. Vygotsky's (1978) sociocultural theories highlight the interactionist perspective in foreign/second language acquisition, emphasizing the role of social interaction and negotiation in language learning. It asserts that AI can emulate this interactive environment and provide immediate, comprehensible feedback aligned with learners' zone of proximal development (ZPD), thus creating a dynamic process akin to human interaction that promotes ongoing engagement through a cycle of generating, receiving, and revising language output. The study also draws on interactionist theory, which suggests that language learning occurs through meaningful interactions between learners and their linguistic environment (Long, 1983; Gass, 2013). ChatGPT functions as an intelligent conversational partner, providing immediate, personalized feedback that helps learners identify language gaps, receive clear guidance, and produce modified output, all of which are crucial for enhancing English proficiency. While interactionist theory highlights how ChatGPT-based feedback facilitates language learning through interaction, Davis' (1989) technology acceptance model focuses on learners' acceptance, engagement, and motivation to use ChatGPT as a learning partner. Together, these theoretical frameworks provide a holistic view of the cognitive-linguistic and behavioral aspects of AI-mediated language learning. Fig. 1 illustrates the theoretical framework combining sociocultural theory, interactionist theory, and the technology acceptance model, showing that feedback via ChatGPT improves writing proficiency.

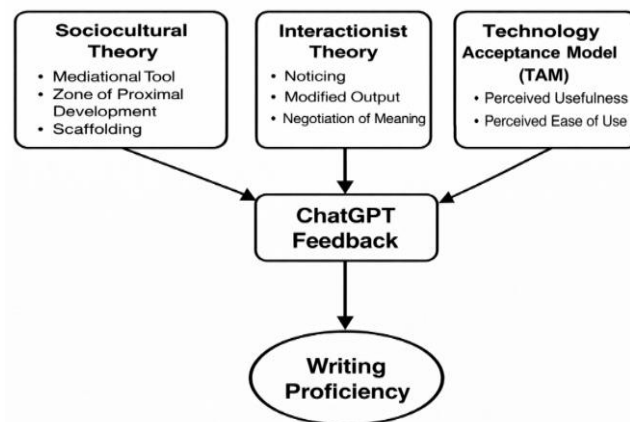


Figure 1. Conceptual Model of ChatGPT Feedback and its impact on Writing Proficiency

2.2 Writing Proficiency in EFL Contexts

Writing is a complex skill that requires linguistic, cognitive, and organizational abilities, posing challenges for EFL learners who need substantial effort and consistent practice to compose, develop, and analyze ideas effectively. (Myles, 2002). EFL learners in Saudi universities face challenges in language acquisition, including limited vocabulary, grammatical errors, and issues with content and coherence in their writing (Alharbi, 2019). Alamin and Ahmed (2012) identified that issues with basic English grammar were influenced by intralingual interference from the target language and interlingual interference from the native language, both of which obstruct grammar comprehension. Many learners struggle with idea generation, paragraph structure, and grammar accuracy. Traditional teacher feedback is often hindered by large classes and time constraints, resulting in generic or delayed responses. This has led to increased interest in AI-based feedback tools to improve writing skills.

2.3 Feedback in EFL Writing: Teacher, Peer, and AI

Feedback is essential for improving learners' understanding and skills, as it helps identify linguistic errors, refine ideas, and enhance organizational structure. Conventional teacher feedback is considered reliable because of its professional advice and contextual insights; however, it faces challenges such as inconsistency, time constraints, and varying levels of clarity (Hyland & Hyland, 2019). Similarly, Peer feedback can enhance collaboration and learning among learners, but its effectiveness may decline if individuals lack proficiency or confidence. Adequate preparation and self-assurance are crucial for ensuring positive outcomes from peer interactions (Yu & Lee, 2016). Automated feedback systems like Grammarly, Criterion, and Write & Improve excel in error detection but fall short in interactivity and contextual support. The advent of generative AI, specifically ChatGPT, enhances feedback by providing personalized, conversational responses that tackle linguistic and content challenges through detailed explanations, examples, and editing suggestions.

Studies show that AI, particularly ChatGPT, positively influences academic writing and language instruction. Song and Song (2023) found that Chinese EFL students who used ChatGPT improved their writing proficiency and motivation, though responses regarding skill development were mixed. Wei (2023) reported that 60 university students who used AI-based instruction excelled over peers in various skills, while Ahn (2024) highlighted the role of large language models in medical writing, citing their advantages and ethical challenges. Additionally, Xu et al. (2024) reported increased self-efficacy and enjoyment among Chinese expatriate students using ChatGPT for language learning, highlighting its effectiveness for international students. A recent study by Utami et al. (2023) indicated that AI tools improved self-regulated learning for academic writing among senior high school students in Central Java, although their support for writing needs and Indonesian text editing was limited. Malik et al. (2023) found that 245 Indonesian undergraduate students viewed AI tools positively for essay writing, advocating for collaboration to uphold originality and ethics. Karataş et al. (2024) reported improvements in writing and motivation among 13 students who used ChatGPT for foreign language learning at a Turkish university. A systematic review by Khalifa and Albadawy (2024) analyzed 24 studies on AI's role in academic writing, confirming its support across writing, grammar, and content structuring, with notable contributions from ChatGPT.

Shen and Chen (2025) examined how four graduate EFL students used ChatGPT for writing. They found that students primarily used the tool for language editing, knowledge acquisition, and inspiration to improve their language skills and access information. The study highlighted that AI tools like ChatGPT can enhance academic writing through self-directed learning, personalized feedback, and increased motivation (Song & Song, 2023; Malik et al., 2023; Karataş et al., 2024; Shen & Chen, 2025). However, it emphasized the need for effective teaching strategies to prevent over-reliance on AI and foster deeper engagement. The findings suggest AI can help develop skilled writers across various educational contexts. Nonetheless, there is still a gap in understanding ChatGPT's impact on specific writing sub-skills, such as grammar, vocabulary, content development, and organization.

2.5 Research Question

1. How does ChatGPT-based feedback, compared to conventional instructor feedback, influence learners' writing performance in terms of vocabulary, grammar, content, and organization?

2.5.1 Research Sub-Questions

1. How does ChatGPT-based feedback affect vocabulary in writing?
2. How does ChatGPT-based feedback affect grammatical accuracy?
3. How does ChatGPT-based feedback affect content quality?
4. How does ChatGPT-based feedback affect writing organization?

3. Methodology

3.1 Respondents and Sample

The study investigated the impact of AI-supported feedback on the writing performance of 60 Arabic-speaking undergraduate EFL learners aged 19 to 24 with 8 to 10 years of English education. Using a quasi-experimental design, participants were assigned to two groups via intact-class assignment, as individual random assignment was not feasible within the institutional context: an experimental group of 30 students received feedback from ChatGPT, while the control group of 30 students received traditional instruction. The evaluation involved pre-test and post-test assessments. Pre-test equivalence between the two groups was confirmed through independent-samples t-tests, which revealed no statistically significant differences in vocabulary ($t(58) = 0.31, p = .756$), grammar ($t(58)$

= 0.46, $p = .650$), content ($t(58) = 0.63$, $p = .532$), or organization ($t(58) = 0.78$, $p = .441$) prior to the intervention, establishing baseline comparability between groups. Ethical considerations were upheld, including informed consent and permission for smartphone use during sessions.

3.2 Treatment

The study examined the impact of AI-generated feedback via the ChatGPT smartphone app, compared with conventional instructor feedback, on EFL writing skills over 7 weeks. The experimental group received feedback from ChatGPT during three weekly one-hour sessions, producing 250-word paragraphs based on given topics or visual prompts. To ensure consistency of AI-generated feedback across participants, students were required to use a standardized prompt when submitting their writing to ChatGPT. A sample prompt used throughout the study read as follows: "Please review the following paragraph written by an EFL learner and provide detailed, specific feedback on: (1) grammar and sentence structure, (2) vocabulary and word choice, (3) content development and idea relevance, and (4) organizational coherence and logical sequencing. Identify errors and suggest concrete improvements for each area." Students were required to document the AI-generated feedback received and apply it systematically during the revision stage, ensuring traceability of the feedback process. After receiving detailed feedback on grammar, vocabulary, content, and organization, students revised their drafts, which facilitated reflection on linguistic errors and enhanced writing clarity and structure. Conversely, the control group received feedback from their instructor on similarly structured tasks and revised their drafts accordingly. By maintaining equivalent writing tasks, durations, and instructional time, the study aimed to attribute any differences in learning outcomes to the type of feedback, thereby assessing the impact of AI feedback relative to conventional methods on the development of EFL writing skills.

3.3 Writing Task and Data Collection Procedure

This study evaluates the effectiveness of instructional interventions using a structured picture-based writing task comprising a pre-test and post-test. Participants first undertook a pre-test in which they interpreted a visual prompt and wrote a descriptive paragraph, providing a baseline assessment of their writing abilities. After seven weeks of instruction, a post-test utilized a different picture prompt to avoid memory effects from the initial task. Both tasks focused on producing approximately 250-word compositions that described and explained the visual content, ensuring uniformity for performance comparison. The writing tasks were conducted in Microsoft Word with the auto-correction feature disabled to maintain authenticity, and all submissions were electronically sent to the instructor for evaluation. The analysis concentrated on vocabulary use, grammatical accuracy, content development, and organizational coherence, utilizing the scripts from these tasks as the primary dataset.

3.4 Writing Assessment Rubric

Writing performance was evaluated using an adapted analytic scoring rubric derived from established EFL frameworks, focusing on four components: vocabulary, grammar, content, and organization. Each component received ratings from 1 (very limited) to 5 (excellent), yielding a maximum achievable score of 20. The rubric is designed to assess the quality of written expression, with specific scoring criteria: a score of 1 indicates significant language errors and poorly developed ideas; 2 signifies noticeable weaknesses; 3 represents moderate performance; 4 shows good performance; and 5 reflects excellence in grammar, vocabulary, idea development, and organization. The definitions for each component are as follows: vocabulary pertains to lexical range and word choice; grammar pertains to sentence structure and accuracy; content pertains to idea clarity and relevance; and organization pertains to logical sequencing and coherence. Each writing script was reviewed by two trained raters, who independently assigned scores to the four categories, resulting in an overall combined performance score. Comprehensive rubric descriptors used during the evaluation are available in Appendix 1.

3.5 Data Analysis and Reliability Procedures

The study employed both descriptive and inferential statistics to evaluate differences in writing performance between the experimental and control groups. Scores from pre-tests and post-tests across vocabulary, grammar, content, and organization were analyzed using paired-sample t-tests for intra-group improvements and independent-samples t-tests for inter-group comparisons. Effect sizes were calculated using Cohen's d for paired-sample comparisons using the formula $d = t / \sqrt{n}$, consistent with paired-samples effect size conventions, and categorized as small (0.2), medium (0.5), or large (≥ 0.8). Two trained raters assessed writing samples based on an analytic rubric, achieving strong inter-rater reliability (ICC = 0.88, 95% CI [0.82, 0.93]; $\alpha \geq .80$), with score discrepancies resolved collaboratively. Grammarly reports aided in error identification but did not influence the human scoring process, which focused on contextual meaning and coherence.

4. Results

Results indicated significant differences in writing performance across vocabulary, grammar, content, and organization between pre-test and post-test phases for both experimental and control groups, with the experimental group showing greater improvement and higher post-test mean scores. In the experimental group, significant improvements in writing performance were observed across all components. Vocabulary scores increased from a pre-test mean of 2.17 (SD = 0.98) to 3.97 (SD = 1.00) ($t(29) = 14.04$, $p < .001$, Cohen's $d = 2.56$), reflecting a richer vocabulary. Grammar scores rose from 2.07 (SD = 0.84) to 4.07 (SD = 0.86) ($t(29) = 18.21$, $p < .001$, Cohen's $d = 3.32$), indicating enhanced syntactic accuracy. Content development improved from 2.32 (SD = 1.15) to 3.32 (SD = 1.18) ($t(29) = 6.60$, $p < .001$, Cohen's $d = 1.20$), suggesting more coherent writing. Organization scores improved from 1.77 (SD = 0.87) to 3.03 (SD = 0.90) ($t(29) = 11.08$, $p < .001$, Cohen's $d = 2.02$). Cohen's d values for paired-sample comparisons were computed using $d = t / \sqrt{n}$. These effect sizes

indicate large improvements across all writing components in the experimental group.

In the control group, improvements were also observed. Vocabulary scores increased from 2.10 (SD = 0.74) to 3.08 (SD = 0.76) ($t(29) = 10.10, p < .001, \text{Cohen's } d = 1.84$). Grammar scores increased from 1.98 (SD = 0.68) to 3.23 (SD = 0.70) ($t(29) = 14.06, p < .001, \text{Cohen's } d = 2.56$). Content scores improved from 2.17 (SD = 0.62) to 2.93 (SD = 0.64) ($t(29) = 9.34, p < .001, \text{Cohen's } d = 1.70$), while organization improved from 1.63 (SD = 0.47) to 2.40 (SD = 0.49) ($t(29) = 12.32, p < .001, \text{Cohen's } d = 2.25$). Although statistically significant improvements were observed, the magnitude of gains remained smaller than those observed in the experimental group.

Table 1. Paired-sample t-test results for writing components (experimental and control groups)

Component	Group	M (Pre-Test)	SD Pre	M (Post-Test)	SD Post	Gain	t (29)	p	Result
Vocabulary	Experimental	2.17	0.98	3.97	1	1.8	14.04	< .001	Significant
	Control	2.1	0.74	3.08	0.76	0.98	10.1	< .001	Significant
Grammar	Experimental	2.07	0.84	4.07	0.86	2	18.21	< .001	Significant
	Control	1.98	0.68	3.23	0.7	1.25	14.06	< .001	Significant
Content	Experimental	2.32	1.15	3.32	1.18	1	6.6	< .001	Significant
	Control	2.17	0.62	2.93	0.64	0.76	9.34	< .001	Significant
Organization	Experimental	1.77	0.87	3.03	0.9	1.26	11.08	< .001	Significant
	Control	1.63	0.47	2.4	0.49	0.77	12.32	< .001	Significant

Note: Gains represent the mean difference between post-test and pre-test scores for each writing component. All improvements were statistically significant ($p < .001$). Cohen's d was computed using the formula $d = t / \sqrt{n}$ for paired-sample comparisons. RC4 SD values for pre- and post-test scores are to be inserted from the raw dataset.

The study (see Table 1) found significant improvements in writing across four components: grammar, vocabulary, organization, and content. The experimental group showed the most significant gains, with a mean increase of 2.00 in grammar compared to 1.25 in the control group, indicating greater syntactic accuracy. Vocabulary improvement was also notable, with gains of 1.80 for the experimental group versus 0.98 for the control group. Content showed the least improvement, with gains of 1.00 for the experimental group and 0.76 for the control group. In the organization, the experimental group improved by 1.26, compared to 0.77 in the control group. Overall, both groups improved significantly, but the experimental group outperformed the control group across all areas, demonstrating greater advancement in writing proficiency.

Table 2. Independent samples t-test for overall gain scores between experimental and control

Group	M (Gain)	SD	t(58)	p	Cohen's d	Interpretation
Experimental	6.07	1.49	6.57	< .001	1.69 [verified: $d = (6.07 - 3.77) / \text{SD}_{\text{pooled}} = 2.30 / 1.353 = 1.70$; difference of 0.01 attributable to rounding]	Large effect
Control	3.77	1.2				

Table 2 displays results from an independent-samples t-test, showing that the experimental group, which received treatment, had a mean gain score of 6.07 (SD = 1.49), significantly higher than the control group's mean gain score of 3.77 (SD = 1.20). The analysis identified a significant difference ($t(58) = 6.57, p < .001$), indicating that the experimental group's improvement was not due to chance, with a large effect size (Cohen's $d = 1.69$) demonstrating a substantial positive impact of the intervention on performance. The Cohen's d value for the independent-samples comparison was verified using the formula $d = (M_1 - M_2) / \text{SD}_{\text{pooled}}$, yielding an approximate value of 1.70, consistent with the reported figure within rounding tolerance. These results confirm that the experimental treatment resulted in significantly greater learning gains than the control group.

5. Discussion

This quasi-experimental study found that ChatGPT feedback significantly enhanced writing skills among Saudi EFL learners more effectively than traditional teacher feedback, particularly in vocabulary, grammar, content development, coherence, and organization. The results support prior research on AI writing tools, highlighting their ability to provide immediate, personalized feedback that improves draft quality. By combining sociocultural and interactionist theories with the technology acceptance model, the study demonstrates AI's influence on cognitive skill development and learner engagement. This approach enhances English language learning through interaction and social support, integrating theoretical constructs with measurable variables. It highlights feedback's importance, explains revision and noticing roles, and assesses learners' willingness to use technology, creating a framework to analyze ChatGPT's impact on EFL writing proficiency.

5.1 The Impact of ChatGPT Feedback on Vocabulary

The study examined the influence of ChatGPT-generated feedback on vocabulary improvement among learners, revealing that those in the experimental group experienced an average vocabulary increase of 1.80, versus 0.98 in the control group. This indicates that ChatGPT's feedback notably enhanced vocabulary development, benefiting learning outcomes through mechanisms such as noticing, interaction,

scaffolding, and deeper cognitive processing, while being influenced by users' skills, attitudes, perceived usefulness, and ease of use (Aldayel & Alalwi, 2024). Multiple studies indicate significant improvements in vocabulary learning among participants using AI tools such as ChatGPT, as shown by Mugableh (2024), Aldowsari & Aljebreen (2024), and Pryma et al. (2025), with experimental groups surpassing control groups in productive vocabulary knowledge and test scores. Algraini (2024) found that ChatGPT was effective for vocabulary acquisition, thanks to its precise definitions and examples. Furthermore, qualitative analysis highlighted positive student perceptions of ChatGPT's impact on contextual vocabulary. Karagoz (2025) confirmed the effectiveness of AI tools in addressing grammar and vocabulary issues.

5.2 The Impact of ChatGPT feedback on Grammar

The study showed significant improvements in grammar among participants, indicating enhanced syntactic accuracy and language control. This growth in syntactic competence resulted from targeted feedback and scaffolded assistance within their Zone of Proximal Development (Vygotsky, 1978). Findings indicate that feedback from ChatGPT enhances writing proficiency across various aspects, including conciseness, grammar, information inclusion, and passive voice use, as confirmed by pretest and posttest results from studies by Behforouz and Al Ghaithi (2024) and Polakova and Ivenz (2024). Recent studies demonstrated that using ChatGPT significantly improved students' writing skills and grammar. Research by Jahan & Mustafa (2024) found fewer grammatical errors and greater appreciation for grammar, while Jamshed et al. (2024) reported notable improvements in students' writing using ChatGPT. Yang (2024) noted that ChatGPT fostered deeper thinking and improved grammar checks, positively impacting vocabulary and organization. Furthermore, Polakova and Ivenz (2024) observed gains in writing performance, including greater conciseness and a more effective use of the passive voice, all attributed to ChatGPT feedback. While studies often highlight the benefits of technology, there is agreement on the essential role of human intervention. For example, Karagoz (2025) highlighted the effectiveness of AI tools for grammar and vocabulary, while also emphasizing the importance of human feedback for contextual revisions.

5.3 The Impact of ChatGPT Feedback on Content Generation

The study found that both instructional methods enhanced writing skills, especially in vocabulary and grammar, while content generation showed less improvement. It emphasized sociocultural theory's focus on interaction and diverse viewpoints, warning that excessive language correction may hinder critical thinking. The experimental group slightly outperformed the control group, supporting the need for ongoing, task-focused strategies to promote deeper cognitive engagement and iterative learning. Multiple studies (Krouska et al., 2022; Kim, 2023; Ba et al., 2025; Aldous et al., 2024) indicate that AI feedback, particularly from ChatGPT, enhances content quality and organization more effectively than traditional teacher feedback. Notably, a study by Ataş et al. (2024) highlighted ChatGPT's superior effectiveness in providing feedback length, while Mun (2024) reported that students using the AI tool exhibited improved holistic scores and a reduction in grammatical and lexical errors. Apriani et al. (2025) found that the experimental group improved their academic writing skills through ChatGPT's assistance with content generation and organization. In contrast, Zou et al. (2025) noted that while students valued teacher feedback, they preferred ChatGPT's insights on organization. Additionally, Alsofyani and Barzanji (2024) reported no significant difference in post-test scores between feedback from ChatGPT and traditional methods. This indicates a potential benefit in using feedback from both sources to enhance EFL writing and teaching methods.

5.4 The Impact of ChatGPT Feedback on the Organization

The intervention improved learners' organizational skills and argument sequencing, enhancing academic writing. Findings support sociocultural theory, indicating that scaffolded support in the Zone of Proximal Development aids the internalization of discourse patterns and the development of self-regulated writing strategies. Multiple studies reveal that ChatGPT significantly influences organizational processes in educational and professional contexts. Thuy et al. (2025) noted its role in facilitating self-directed learning among university students, promoting strategies for autonomous learning. Mahapatra (2024) emphasized ChatGPT's ability to generate quality text and provide feedback on language use. Polakova and Ivenz (2024) found that AI-driven feedback notably impacts writing development, particularly in content and organization, as viewed by EFL teachers. Additionally, Alanazi et al. (2025) recognized ChatGPT's educational potential while urging further exploration of its ethical implications and long-term effects. Masoudi (2024) found that ChatGPT enhances writing proficiency and provides personalized feedback to Saudi EFL learners, indicating its effectiveness in language education. This finding is supported by multiple studies (Boudouaia et al., 2024; Guo & Wang, 2023; Mahapatra, 2024; Teng, 2024; Mun, 2024; Jamshed et al., 2024; Zou et al., 2025), which demonstrate that ChatGPT promotes autonomous learning, enhances communication and writing skills, supports inquiry-based processes, and facilitates innovation, resulting in more adaptive and responsive learning environments. However, some studies, including Niloy et al. (2023), show a negative correlation between ChatGPT use and university students' creative writing skills, suggesting that AI may undermine writing abilities. AlGhamdi (2024) highlighted the potential of ChatGPT as an educational tool, stressing the need for a balanced, adaptable, and personalized feedback system. Other studies (Al-Sofi, 2024; Werdiningsih et al., 2024) also advocate for a balanced approach between technology and human intervention.

Finally, it was revealed that ChatGPT feedback significantly improved EFL learners' grammar, vocabulary, and writing organization, highlighting the importance of AI-driven feedback in enhancing writing skills based on sociocultural and interactionist learning theories.

5.5 Ethical discussion on AI use, student dependence, and academic integrity

The integration of AI tools like ChatGPT in language education presents both opportunities and challenges. While they offer personalized feedback, oversight is crucial to avoid dependence and maintain academic integrity. Instructors should utilize AI as a supportive resource,

ensuring clear guidelines and transparency in academic tasks. Teacher involvement is essential for interpreting AI feedback and fostering digital literacy, ensuring these tools enhance rather than replace traditional teaching while upholding academic writing standards.

6. Conclusion

This study examined how integrating ChatGPT impacted the writing proficiency of EFL learners, highlighting improvements in vocabulary, grammar, content development, and organizational coherence. It was found that ChatGPT feedback significantly enhanced the writing proficiency of Saudi EFL learners by improving vocabulary, grammar, content development, coherence, and organization. Learners receiving individualized feedback engaged in self-correction, resulting in better outcomes than with traditional feedback. Post-test scores for the experimental group demonstrated notable improvements. The findings show that ChatGPT serves as an important tool for learners to improve vocabulary, grammar, and content organization through iterative feedback. The research emphasizes the potential of AI tools in complementing teacher feedback and support learner-centered writing instruction in university EFL programs, improving students' academic writing and aligning language learning with professional standards.

Pedagogical implications

The findings underscore the practical benefits of incorporating AI-assisted feedback into university-level EFL education. ChatGPT serves as a supplementary instructional tool that enhances, rather than replaces, teacher feedback. It fosters active engagement and supports learner-centered methods, improving academic writing skills and aligning with technology-driven education. This scalable feedback elevates instructional quality and encourages independent learning, equipping students for global communication challenges.

Theoretical contribution

This study extends the Zone of Proximal Development (ZPD) concept to AI-mediated learning, suggesting that ChatGPT acts as digital scaffolding. It offers adaptive support similar to human guidance, enabling learners to improve their writing through iterative feedback. This indicates that AI tools can partially mediate learning, promote socially constructed knowledge, and still require teacher oversight.

Limitations

The study highlights the advantages of AI-driven feedback in education but is limited by a small sample size and short duration. It reports variability in student engagement with ChatGPT and raises concerns about assessment subjectivity, lacking a comparative analysis of AI tools.

Future research directions

Future research should examine the sustainability of writing proficiency improvements and long-term effects of AI-assisted feedback in the context of Saudi Arabia's Vision 2030. It should assess the integration of AI feedback with traditional teaching methods, student perceptions, and compare the effectiveness of ChatGPT with other AI writing tools in EFL education.

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Authors' contributions

Dr. Fahd Shehail Alalwi and Dr. Mohammad Jamshed conceptualized and prepared the manuscript, while Dr. Nasser Alqahtani and Dr. Md. Firoj Ahmmed revised the manuscript, and all writers approved the article, contributing equally to the work.

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Data sharing statement

No additional data are available.

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References

- Abdelhalim, S. M., & Alsehibany, R. (2025). Integrating ChatGPT for vocabulary learning and retention: A classroom-based study of Saudi EFL learners. *Language Learning & Technology*, 1-24. <https://doi.org/10.64152/10125/73635>
- Ahn, S. (2024). The transformative impact of large language models on medical writing and publishing: current applications, challenges and future directions. *Korean Journal of Physiology and Pharmacology*, 28(5), 393-401. <https://doi.org/10.4196/kjpp.2024.28.5.393>
- Al Fraidan, A., & Alaliwi, M. (2024). Digital Transformation for Sustainable English Language Learning: Insights from Saudi Arabia and Global Perspectives. *Forum for Linguistic Studies*, 6(6), 439-449. <https://doi.org/10.30564/fls.v6i6.7754>
- Alamin, A., & Ahmed, S. (2012). Syntactical and punctuation Errors: An analysis of Technical Writing of University Students, Science College, Taif University, KSA. *English Language Teaching*, 5(5), 2-8. <https://doi.org/10.5539/elt.v5n5p2>
- Alanazi, S. M., Elmotri, B., Khamis, G. S., & Darem, A. A. (2025b). Assessing the efficacy of ChatGPT's automated corrective feedback in enhancing students' writing proficiency. *International Journal of Advanced and Applied Sciences*, 12(2), 205-214. <https://doi.org/10.21833/ijaas.2025.02.022>
- Alawerdy, A. S., & Alalwi, F. S. (2022). Enhancing English as a foreign language university students' writing through explicit instruction of conjunctions as cohesive devices: An experimental study. *Frontiers in Psychology*, 13, 1053310. <https://doi.org/10.3389/fpsyg.2022.1053310>
- Aldayel, E. S., & Alalwi, F. S. (2024). Using Global Marvels Platform by Children for learning English as a Foreign Language: Saudi parents' perceptions. *Arab World English Journal*, 10, 191-203. <https://doi.org/10.24093/awej/call10.13>
- Aldous, K., Salminen, J., Farooq, A., Jung, S. G., & Jansen, B. (2024). Using ChatGPT in content marketing: enhancing users' social media engagement in cross-platform content creation through generative AI. In *Proceedings of the 35th ACM conference on hypertext and social media* (pp. 376-383). <https://doi.org/10.1145/3648188.3675142>
- Aldowsari, B. I., & Aljebreen, S. G. (2024). The Impact of Using a ChatGPT-based application to Enhance Saudi Students' EFL Vocabulary Learning. *International Journal of Language and Literary Studies*, 6(4), 380-397. <https://doi.org/10.36892/ijlls.v6i4.1955>
- AlGhamdi, R. (2024). Exploring the impact of ChatGPT-generated feedback on technical writing skills of computing students: A blinded study. *Education and Information Technologies*, 29(14), 18901-18926. <https://doi.org/10.1007/s10639-024-12594-2>
- Algraini, F. N. (2024). Saudi Female EFL learners' perceptions of the impact of CHATGPT on vocabulary improvement. *Theory and Practice in Language Studies*, 14(8), 2563-2573. <https://doi.org/10.17507/tpls.1408.29>
- Alharbi, M. A. (2019). Saudi Arabia EFL university students' voice on challenges and solutions in learning academic writing. *Indonesian Journal of Applied Linguistics*, 8(3), 576-587. <https://doi.org/10.17509/ijal.v8i3.15276>
- Alhusaiyan, E. (2025). A systematic review of current trends in artificial intelligence in foreign language learning. *Saudi Journal of Language Studies*, 5(1), 1-16. <https://doi.org/10.1108/sjls-07-2024-0039>
- Al-Jahwari, M. and Yousif, M. J. (2025). The impact of AI tools on Education: ChatGPT in focus. *Artificial Intelligence & Robotics Development Journal*, 4(4), 314-336. pp. <https://doi.org/10.52098/airdj.20244430>
- Al-Sofi, B. B. M. A. (2024). Artificial intelligence-powered tools and academic writing: to use or not to use ChatGPT. *Saudi Journal of Language Studies*, 4(3), 145-161. <https://doi.org/10.1108/sjls-06-2024-0029>
- Alsofyani, A. H., & Barzanji, A. M. (2024). The Effects of ChatGPT-Generated Feedback on Saudi EFL Learners' Writing Skills and Perception at the Tertiary Level: A Mixed-Methods Study. *Journal of Educational Computing Research*, 63(2), 431-463. <https://doi.org/10.1177/07356331241307297>
- Apriani, E., Daulay, S. H., Aprilia, F., Marzuki, A. G., Warsah, I., Supardan, D., & Muthmainnah, N. (2025). A Mixed-Method study on the effectiveness of using ChatGPT in academic writing and students' perceived experiences. *Journal of Language and Education*, 11(1), 26-45. <https://doi.org/10.17323/jle.2025.17913>
- Asem, A., Abdullah Y, Ousif R. A. G., Mohammad, A. A., & Ziyad, I. A. (2024). Navigating Digital Transformation in Alignment with Vision 2030: A Review of Organizational Strategies, Innovations, and Implications in Saudi Arabia. *Journal of Knowledge Learning and Science Technology*, 3(2), 21-29. <https://doi.org/10.60087/jklst.vol3.n2.p29>
- Ataş, A. H., Cengiz, B. C., & Çelik, B. (2024). Evaluating ChatGPT in generating feedback on content and organization components of EFL

- compare and contrast essays. *Sakarya University Journal of Education*, 14(3), 515-538. <https://doi.org/10.19126/suje.1475474>
- Ayeni, N. A. O., Ovbiye, N. R. E., Onayemi, N. A. S., and Ojedele, N. K. E. (2024). AI-driven adaptive learning platforms: Enhancing educational outcomes for students with special needs through user-centric, tailored digital tools. *World Journal of Advanced Research and Reviews*, 22(3), 2253-2265. <https://doi.org/10.30574/wjarr.2024.22.3.0843>
- Ba, S., Zhan, Y., Huang, L., and Lu, G. (2025). Investigating the impact of ChatGPT-assisted feedback on the dynamics and outcomes of online inquiry-based discussion. *British Journal of Educational Technology*. <https://doi.org/10.1111/bjet.13605>
- 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>
- Bettayeb, A. M., Talib, M. A., Altayasinah, A. Z. S., and Dakalbab, F. 2024. Exploring the impact of ChatGPT: conversational AI in education. *Frontiers in Education*, 9. <https://doi.org/10.3389/feduc.2024.1379796>
- Bolsunovskaya, M., & Rymanova, I. (2020). Academic Writing: Difficulties and possible solutions for engineering students. *Всёsee Образование V Rossii*, 29(10), 77-85. <https://doi.org/10.31992/0869-3617-2020-29-10-77-85>
- Boudouaia, A., Mouas, S., & Kouider, B. (2024). A Study on ChatGPT-4 as an Innovative Approach to Enhancing English as a Foreign Language Writing Learning. *Journal of Educational Computing Research*, 62(6), 1289-1317. <https://doi.org/10.1177/07356331241247465>
- Chen, D., Hebert, M., & Wilson, J. (2022). Examining Human and Automated Ratings of Elementary Students' Writing Quality: A Multivariate Generalizability Theory Application. *American Educational Research Journal*, 59(6), 1122-1156. <https://doi.org/10.3102/00028312221106773>
- Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*, 13(3), 319-340. <https://doi.org/10.2307/249008>
- Deep, P. D., & Chen, Y. (2025). The Role of AI in Academic Writing: Impacts on Writing Skills, Critical Thinking, and Integrity in Higher Education. *Societies*, 15(9), 247. <https://doi.org/10.3390/soc15090247>
- Fareed, M., Ashraf, A., & Bilal, M. (2016). ESL Learners' writing skills: Problems, factors and suggestions. *Journal of Education & Social Sciences*, 4(2), 83-94. <https://doi.org/10.20547/jess0421604201>
- Fyka, A. M. (2024). Artificial intelligence in foreign language education. *European Journal of Engineering and Technology Research*. 63-68. <https://doi.org/10.24018/ejeng.2024.1.cie.3236>
- Gass, S. M. (2013). *Input, interaction, and the second language learner*. Routledge. <https://doi.org/10.4324/9780203053560>
- Gilbert, I. (2023). A machine in the loop: the peculiar intervention of artificial intelligence in writer's block. *New Writing*, 21(1), 26-37. <https://doi.org/10.1080/14790726.2023.2223176>
- Guo, K., & Wang, D. (2023). To resist it or to embrace it? Examining ChatGPT's potential to support teacher feedback in EFL writing. *Education and Information Technologies*, 29(7), 8435-8463. <https://doi.org/10.1007/s10639-023-12146-0>
- Hyland, K., & Hyland, F. (Eds.). (2019). *Feedback in second language writing: Contexts and issues*. Cambridge University Press. <https://doi.org/10.1017/9781108635547>
- Jahan, J., Arif, B., & Mustafa, U. (2024). Enhancing Practical English Grammar Skills through AI: A Study on the Impact of ChatGPT-Assisted Feedback on Student Writing. (2024). *Contemporary Journal of Social Science Review*, 2(4), 217-229. Retrieved from <https://contemporaryjournal.com/index.php/14/article/view/164>
- Jamshed, M., Ahmed, N. A. S. M. M., Sarfaraj, N. M., & Warda, N. W. U. (2024). The impact of ChatGPT on English language learners' writing skills. *International Journal of Interactive Mobile Technologies (iJIM)*, 18(19), 18-36. <https://doi.org/10.3991/ijim.v18i19.50361>
- Jarrah, A. M., Wardat, Y., & Fidalgo, P. (2023). Using ChatGPT in academic writing is (not) a form of plagiarism: What does the literature say? *Online Journal of Communication and Media Technologies*, 13(4), e202346. <https://doi.org/10.30935/ojcm/13572>
- Javaid, M., Haleem, A., Singh, R. P., Khan, S., & Khan, I. H. (2023). Unlocking the opportunities through ChatGPT Tool towards ameliorating the education system. *Bench Council Transactions on Benchmarks Standards and Evaluations*, 3(2), 100115. <https://doi.org/10.1016/j.tbench.2023.100115>
- Karagoz, I. (2025). AI-generated feedback in English writing instruction for language learners: A systematic review. *The Reading Matrix: An International Online Journal*, 25(1), 51-67. Retrieved from <https://www.readingmatrix.com/files/34-9gp90gjo.pdf>
- Karataş, F., Abedi, F. Y., Gunyel, F. O., 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>
- Khalifa, M., & Albadawy, M. (2024). Using artificial intelligence in academic writing and research: An essential productivity tool. *Computer Methods and Programs in Biomedicine Update*, 5, 100145. <https://doi.org/10.1016/j.cmpbup.2024.100145>

- Kim T. W. (2023). Application of artificial intelligence chatbots, including ChatGPT, in education, scholarly work, programming, and content generation, and its prospects: a narrative review. *Journal of Educational Evaluation for Health Professions*, 20, 38. <https://doi.org/10.3352/jeehp.2023.20.38>
- Krouska, A., Troussas, C., Voyiatzis, I., Mylonas, P., & Sgouropoulou, C. (2024, November). ChatGPT-based Recommendations for Personalized Content Creation and Instructional Design with a Tailored Prompt Generator. In *FLLM* (pp. 295-299). <https://doi.org/10.1109/FLLM63129.2024.10852487>
- Long, M. H. (1983). Native speaker/non-native speaker conversation and the negotiation of comprehensible input 1. *Applied linguistics*, 4(2), 126-141. <https://doi.org/10.1093/applin/4.2.126>
- Mahapatra, S. (2024). Impact of ChatGPT on ESL students' academic writing skills: A mixed-methods intervention study. *Smart Learning Environments*, 11(1), 9. <https://doi.org/10.1186/s40561-024-00295-9>
- Malik, A. R., Pratiwi, Y., Andajani, K., Numertayasa, I. W., Suharti, S., Darwis, A., & Marzuki, N. (2023). Exploring Artificial Intelligence in Academic Essay: Higher Education Students' Perspective. *International Journal of Educational Research Open*, 5, 100296. <https://doi.org/10.1016/j.ijedro.2023.100296>
- Marzuki, Widiati, U., Rusdin, D., Darwin, & Indrawati, I. (2023). The impact of AI writing tools on the content and organization of students' writing: EFL teachers' perspective. *Cogent Education*, 10(2), 1-17. <https://doi.org/10.1080/2331186X.2023.2236469>
- Masoudi, H. (2024). Effectiveness of ChatGPT in Improving English Writing Proficiency among Non-native English Speakers. *International Journal of Educational Sciences and Arts*, 3(4), 62-84. <https://doi.org/10.59992/ijesa.2024.v3n4p2>
- Mohammad, T., & Hazarika, Z. (2016). Difficulties of Learning EFL in KSA: Writing Skills in Context. *International Journal of English Linguistics*, 6(3), 105. <https://doi.org/10.5539/ijel.v6n3p105>
- Mugableh, A. I. (2024). The Impact of ChatGPT on the Development of Vocabulary Knowledge of Saudi EFL Students (May 2, 2024). *Arab World English Journal (AWEJ) Special Issue on ChatGPT*, April 2024. <https://doi.org/10.31235/osf.io/fvsu4>
- Mun, C. Y. (2024). EFL learners' English writing feedback and their perception of using ChatGPT. *Journal of English Teaching through Movies and Media*, 25(2), 26-39. <https://doi.org/10.16875/stem.2024.25.2.26>
- Myles, J. (2002). Second language writing and research: The writing process and error analysis in student texts. *TESL-EJ*, 6(2), 1-20. Retrieved from <https://tesl-ej.org/wordpress/issues/volume6/ej22/ej22a1/?wscr>
- Niloy, A. C., Akter, S., Sultana, N., Sultana, J., & Rahman, S. I. U. (2023). Is ChatGPT a menace for creative writing ability? An experiment. *Journal of Computer Assisted Learning*, 40(2), 919-930. <https://doi.org/10.1111/jcal.12929>
- Polakova, P., & Ivenz, P. (2024). The impact of ChatGPT feedback on the development of EFL students' writing skills. *Cogent Education*, 11(1). <https://doi.org/10.1080/2331186X.2024.2410101>
- Pryma, V., Pelivan, O., Teletska, T., Tsobenko, O., & Zagrebena, N. (2025). AI Writing Assistants and Student Competence: A Linguistic Aspect. *Arab World English Journal (AWEJ) Special Issue on Artificial Intelligence*: 319-329. <https://doi.org/10.24093/awej/AI.18>
- Shafii, R. A., & Berger, J. L. (2025). Teacher assessment literacy, formative assessment practices, and their perceived efficacy in Tanzania: A scoping review. *Studies in Educational Evaluation*, 86, 101496. <https://doi.org/10.1016/j.stueduc.2025.101496>
- Shen, Y., & Chen, L. (2025). 'Critical chatting' or 'casual cheating': how graduate EFL students utilize ChatGPT for academic writing. *Computer-Assisted Language Learning*, 1-29. <https://doi.org/10.1080/09588221.2025.2479141>
- Song, C. and 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. <https://doi.org/10.3389/fpsyg.2023.1260843>
- Steiss, J., Tate, T., Graham, S., Cruz, J., Hebert, M., Wang, J., ... Olson, C. B. (2024). Comparing the quality of human and ChatGPT feedback of students' writing. *Learning and Instruction*, 91, 101894. <https://doi.org/10.1016/j.learninstruc.2024.101894>
- Teng, M. F. (2024). "ChatGPT is the companion, not enemies": EFL learners' perceptions and experiences in using ChatGPT for feedback in writing. *Computers and Education: Artificial Intelligence*, 7, 100270. <https://doi.org/10.1016/j.caeai.2024.100270>
- Thuy, D. T. T., Tam, N. T., Chinh, L. T. K., Yen, N. T. H., & Giang, B. T. H. (2025). The impact of Chat GPT on the self-learning of undergraduate students. *VNU Journal of Science Education Research*. <https://doi.org/10.25073/2588-1159/vnuer.5323>
- Utami, S. P. T., Andayani, Winarni, R., & Sumarwati. (2023). Utilization of artificial intelligence technology in an academic writing class: How do Indonesian students perceive? *Contemporary Educational Technology*. 15(4), ep450. <https://doi.org/10.30935/cedtech/13419>
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes* (Vol. 86). Harvard university press.
- 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>
- Werdiningsih, I., Marzuki, & Rusdin, D. (2024). Balancing AI and authenticity: EFL students' experiences with ChatGPT in academic writing. *Cogent Arts & Humanities*, 11(1). <https://doi.org/10.1080/2331186X.2024.2392388>

Wilson, J., Myers, M. C., & Potter, A. (2022). Investigating the promise of automated writing evaluation for supporting formative writing assessment at scale. *Assessment in Education Principles Policy and Practice*, 29(2), 183-199. <https://doi.org/10.1080/0969594x.2022.2025762>

Xu, S., Chen, P., & Zhang, G. (2024). Exploring the impact of the use of ChatGPT on foreign language self-efficacy among Chinese students studying abroad: The mediating role of foreign language enjoyment. *Heliyon*, 10(21), e39845. <https://doi.org/10.1016/j.heliyon.2024.e39845>

Yang, Y. (2024). An empirical study on the impact of ChatGPT on writing proficiency in Chinese EFL learners. *Curriculum and Teaching Methodology*, 7(4), 172-178. <http://dx.doi.org/10.23977/curtm.2024.070425>

Yu, S., & Lee, I. (2016). Peer feedback in second language writing (2005–2014). *Language Teaching*, 49(4), 461–493. <https://doi.org/10.1017/s0261444816000161>

Zou, S., Guo, K., Wang, J., & Liu, Y. (2025). Investigating students’ uptake of teacher- and ChatGPT-generated feedback in EFL writing: a comparison study. *Computer Assisted Language Learning*, 1-30. <https://doi.org/10.1080/09588221.2024.2447279>

Appendix 1

Analytic Writing Assessment Rubric

5 (Excellent)	Wide lexical range and accurate word choice	and	Highly accurate grammar with minimal errors	Ideas are clear, relevant, and well developed	Clear logical organization with effective transitions
4 (Good)	Good vocabulary range with minor lexical errors	with	Mostly accurate grammar with occasional errors	Ideas are relevant and adequately developed	Logical paragraph structure with minor coherence issues
3 (Moderate)	Adequate vocabulary but limited variety	but	Noticeable grammatical errors but meaning remains clear	Ideas moderately developed	Basic organization with some coherence issues
2 (Limited)	Limited vocabulary and frequent word repetition	and	Frequent grammatical errors affecting clarity	Ideas weakly developed	Weak paragraph organization
1 (Very Limited)	Very limited vocabulary and inappropriate word use	and	Persistent grammar errors that impede meaning	Ideas unclear or poorly developed	No clear organizational structure