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The Effect of ChatGPT-Assisted Writing on EFL Students' Academic Writing Skills

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A B S T R A C T

Artificial Intelligence (AI) has become increasingly significant in higher students, particularly in improving their academic writing skills. AI-powered tools such as ChatGPT offer immediate feedback, grammar correction, vocabulary enhancement, idea generation, and text organization, which can support EFL learners in the writing process. Academic writing is often considered one of the most challenging skills for EFL students due to difficulties in language accuracy, coherence, and idea development. Although many students use AI tools in writing classes, limited empirical studies have examined the direct effect of ChatGPT-assisted writing on students' academic writing performance, especially in the Indonesian EFL context. This study aimed to investigate the effect of ChatGPT-assisted writing on EFL students' academic writing skills. The study employed a quasi-experimental design using a pre-test and post-test control group design involving 50 higher students divided into experimental (25 students) and control groups (25 students). The experimental group received ChatGPT-assisted writing instruction, while the control group received conventional writing instruction. The findings revealed that the experimental group achieved significantly higher post-test scores than the control group ($p < 0.05$). It can be concluded that ChatGPT-assisted writing effectively improves students' academic writing skills.

Keywords: *Artificial Intelligence, ChatGPT, Academic Writing, EFL Students, Writing Skills*

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INTRODUCTION

In recent years, the rapid development of Artificial Intelligence (AI) has significantly transformed various aspects of education, particularly in language learning and academic writing. AI-powered tools such as ChatGPT, Grammarly, QuillBot, and other generative writing assistants have become increasingly popular among students and educators for supporting writing processes, improving language accuracy, and enhancing academic productivity. These tools provide immediate feedback, grammar correction, vocabulary suggestions, idea generation, and text organization, making them especially useful for learners of English as a Foreign Language (EFL). In EFL contexts, where students often face difficulties in linguistic accuracy and idea development, AI tools can function as effective scaffolding to support the writing process (Zhang & Hyland, 2022). Furthermore, AI-assisted feedback has been shown to improve students' writing quality, particularly in terms of grammatical accuracy and lexical diversity (Li, 2023). The use of AI tools also encourages learner autonomy, as students can independently revise and refine their work (Ranalli, 2021). However, despite these benefits, the integration of AI in academic writing also raises important concerns. Some studies highlight that overreliance on AI tools may limit students' critical thinking and originality in writing (Kasneci et al., 2023). Additionally, students may depend too heavily on automated corrections without fully understanding the underlying language rules. Therefore, while AI offers significant advantages in supporting EFL writing, its use should be carefully guided to ensure meaningful and balanced learning outcomes.

Academic writing requires students to demonstrate not only grammatical competence but also coherence, critical thinking, argument development, and discipline-specific language use. Many EFL learners struggle with these demands due to limited vocabulary, lack of writing confidence, insufficient exposure to academic discourse, and difficulties in organizing ideas effectively. Traditional writing instruction sometimes fails to provide immediate and individualized feedback, which may hinder students' writing development. In this regard, AI-assisted writing tools have emerged as alternative pedagogical supports that can facilitate students' writing practice and reduce writing anxiety. According to Song & Song (2023), ChatGPT significantly contributes to improving students' academic writing skills and motivation by providing interactive support and personalized writing assistance. Similarly, Alkamel & Alwagieh (2024) found that ChatGPT enhances academic writing performance among university EFL students by improving idea development and language accuracy.

Despite these potential benefits, the use of AI in academic writing also raises important concerns related to academic integrity, critical thinking, and students' overdependence on technology. Deep & Chen (2025) emphasize that while AI can improve writing efficiency, excessive reliance on AI-generated content may reduce students' independent thinking and originality in writing. Likewise, Dergaa et al. (2023) argue that the increasing use of ChatGPT in academic writing creates challenges regarding authorship, plagiarism, and ethical responsibility. Students may use AI not as a learning assistant but as a shortcut to complete assignments without fully engaging in the writing process. This situation highlights the need for educators to establish clear pedagogical boundaries and ethical guidelines for AI use in writing instruction.

Furthermore, students' perceptions toward AI-assisted writing vary depending on their academic background, technological familiarity, and learning needs. Kim et al. (2025) reported that many students view generative AI as a helpful learning partner rather than a replacement for human writing, especially when used for brainstorming, revising, and language improvement. Nguyen et al. (2024) also explain that effective human-AI collaboration in writing depends on how students strategically use AI to support, rather than substitute, their cognitive engagement. Therefore, understanding the actual impact of AI on students' writing performance requires not only examining writing outcomes but also exploring how students interact with AI tools during the writing process.

In the Indonesian EFL context, the integration of AI in academic writing instruction remains relatively underexplored, particularly at the university level. Although AI tools are increasingly accessible, empirical studies investigating their direct effect on students' academic writing skills are still limited. Most previous studies focus on students' perceptions or ethical issues rather than measurable improvements in writing achievement. Utami & Winarni (2023) found that Indonesian students generally respond positively to AI technology in academic writing classes; however, further research is needed to determine whether such positive perceptions correspond to actual writing improvement. This research gap becomes particularly important as universities seek innovative strategies to improve students' academic writing competence while maintaining academic integrity.

Based on these considerations, this study aims to investigate the effect of ChatGPT-assisted writing on EFL students' academic writing skills. Specifically, the study seeks to examine whether the use of ChatGPT as a writing assistant significantly improves students' writing performance compared to conventional writing instruction. This research is expected to contribute to the growing body of literature on AI-assisted language learning and provide practical implications for English lecturers in designing effective, ethical, and technology-integrated writing instruction. Ultimately, the findings may help higher education institutions develop balanced approaches to utilizing AI as a supportive tool for academic writing development rather than as a replacement for students' own intellectual efforts.

Artificial Intelligence (AI) refers to computer systems designed to perform tasks that typically require human intelligence, such as problem-solving, language processing, decision-making, and text generation. In the field of education, AI has become an increasingly influential tool, particularly in language learning and academic writing instruction. AI-

powered writing tools such as ChatGPT, Grammarly, QuillBot, and other generative platforms provide students with immediate feedback, grammar correction, vocabulary enhancement, idea generation, and structural suggestions that support the writing process. These technologies have transformed traditional writing practices by offering more personalized and accessible learning assistance.

According to Khalifa & Albadawy (2024), AI has become an essential productivity tool in academic writing and research because it helps students and researchers organize ideas, improve writing efficiency, and reduce time spent on mechanical editing. AI supports not only linguistic accuracy but also academic productivity by assisting in drafting, revising, and refining scholarly work. Similarly, Aljuaid (2024) states that AI tools significantly improve academic writing instruction in higher education by facilitating interactive learning environments and individualized writing support. This is especially beneficial for EFL learners who often require continuous feedback during the writing process.

However, the use of AI in writing is not without challenges. Miao et al. (2023) highlight ethical dilemmas such as plagiarism, authorship ambiguity, and misuse of AI-generated content in academic writing. When students rely excessively on AI tools, they may compromise originality and academic integrity. Therefore, educators are encouraged to guide students in using AI responsibly as a learning assistant rather than as a substitute for independent writing. Transparency in declaring AI usage, as emphasized by Tang et al. (2024), is also necessary to maintain ethical academic practices.

In this study, AI specifically refers to the use of ChatGPT-assisted writing as a pedagogical support tool in academic writing classes. ChatGPT is used to help students generate ideas, revise sentence structures, improve grammar, and develop coherent academic paragraphs. Its role is positioned as a writing assistant that facilitates learning rather than replacing students' cognitive effort in composing academic texts.

ChatGPT is a generative AI language model developed to produce human-like text responses based on user prompts. In educational contexts, ChatGPT has gained significant attention for its potential to support writing instruction, particularly in English language learning. Students can use ChatGPT to brainstorm ideas, generate outlines, revise drafts, receive grammar suggestions, and improve sentence clarity. This interactive writing support allows learners to engage in a more dynamic and immediate writing process compared to traditional feedback systems.

Song & Song (2023) found that ChatGPT enhances academic writing skills and students' motivation in AI-assisted language learning environments. Their study revealed that students who used ChatGPT showed improvement in writing fluency, vocabulary use, and confidence in completing writing tasks. Similarly, Alkamel & Alwagieh (2024) reported that Yemeni EFL university students experienced significant improvement in academic writing performance after using ChatGPT as an adaptable writing tool. The tool helped students generate ideas more effectively and revise their work with greater independence.

Fathi & Rahimi (2026) further explain that AI-enhanced writing mediation contributes to deeper writing engagement by encouraging students to reflect on language choices and textual organization. Instead of simply receiving corrections, students interact with AI-generated suggestions and make decisions regarding content revision. This process supports autonomous learning and writing development. Nguyen et al. (2024) also note that successful human-AI collaboration depends on how learners strategically use AI to support rather than replace their writing efforts.

Nevertheless, excessive dependence on ChatGPT may reduce students' critical thinking and originality if it is used improperly. Deep & Chen (2025) warn that overreliance on AI-generated content can weaken students' writing competence because learners may prioritize convenience over cognitive engagement. Therefore, effective implementation of ChatGPT-assisted writing requires pedagogical control, clear instruction, and ethical awareness.

In this research, ChatGPT-assisted writing is treated as the independent variable (X), focusing on how the use of ChatGPT influences students' writing processes and academic writing outcomes.

Academic writing skills refer to the ability to produce clear, coherent, structured, and formal written texts that meet academic standards. These skills involve not only grammar and vocabulary mastery but also critical thinking, argument development, logical organization, citation awareness, and discipline-specific language use. For EFL students, academic writing is often considered one of the most difficult language skills because it requires both linguistic competence and higher-order thinking abilities.

According to Selim (2024), academic writing competence includes idea development, coherence, cohesion, grammatical accuracy, lexical sophistication, and audience awareness. Students are expected to write not only correctly but also persuasively and critically. In higher education, academic writing plays an important role in assignments, research papers, reports, and scholarly communication. Therefore, improving writing skills becomes a central objective in English language instruction.

Tran (2023) explains that AI tools can support the teaching and learning of English academic writing by providing immediate feedback and helping students recognize weaknesses in grammar, vocabulary, and text organization. This is particularly valuable for students who struggle with self-editing and revision. Similarly, Utami & Winarni (2023) found that Indonesian students perceive AI-assisted writing as helpful in improving writing confidence and reducing anxiety during academic writing tasks.

Writing quality is commonly measured through several indicators such as content relevance, organization, grammar, vocabulary, mechanics, and coherence. These indicators are often used in writing rubrics to assess students' academic writing performance before and after instructional interventions. In quasi-experimental studies, writing tests are frequently used to determine whether instructional strategies significantly improve students' writing achievement.

In this study, academic writing skills function as the dependent variable (Y), focusing on students' ability to produce academic paragraphs after receiving ChatGPT-assisted writing treatment. Improvement in writing quality will be assessed through pre-test and post-test writing performance.

The relationship between ChatGPT-assisted writing and academic writing skills has become an important topic in recent educational research. AI tools provide immediate feedback, personalized suggestions, and writing support that can potentially improve students' academic writing performance. Unlike conventional writing instruction that depends heavily on delayed teacher feedback, ChatGPT offers real-time assistance, allowing students to revise and improve their writing more efficiently.

Al-Sofi (2024) argues that AI-powered writing tools positively affect students' writing development when used as learning support rather than content replacement. Students benefit from enhanced vocabulary choices, better sentence structures, and clearer organization of ideas. Xu et al. (2025) also found that EFL learners who strategically use AI writing tools demonstrate stronger revision practices and greater writing awareness.

However, the effectiveness of ChatGPT-assisted writing largely depends on students' learning strategies and teacher supervision. Without proper guidance, students may become passive users of AI-generated text instead of active writers. Ethical awareness and instructional design are therefore essential to ensure that AI promotes learning rather than dependency.

This study investigates whether ChatGPT-assisted writing significantly affects EFL students' academic writing skills. The conceptual framework assumes that appropriate use of ChatGPT can improve students' writing performance by supporting idea generation, language accuracy, and revision processes while maintaining learner autonomy and academic integrity.

METHOD

This study employed a quantitative research approach using a quasi-experimental design to investigate the effect of ChatGPT-assisted writing on EFL students' academic writing skills. Quasi-experimental research was chosen because it allows the researcher to examine the causal relationship between the independent variable and the dependent variable in an educational setting where random assignment of participants is difficult to implement. The study specifically used a pre-test and post-test control group design, in which two groups of students were involved: an experimental group and a control group.

The experimental group received writing instruction using ChatGPT-assisted writing activities, while the control group received conventional writing instruction without the use of AI tools. Both groups were given a pre-test before the treatment to measure their initial academic writing ability and a post-test after the treatment to determine the improvement in writing performance. The difference between the pre-test and post-test scores was used to identify the effectiveness of ChatGPT-assisted writing in improving students' academic writing skills.

Population and Sample

The population of this study consisted of undergraduate EFL students enrolled in academic writing courses at the university level. These students were selected because academic writing is a core component of English language learning in higher education and many students experience difficulties in developing formal academic texts.

The sample was selected using purposive sampling technique, focusing on students who were taking academic writing classes during the semester of the research. Two intact classes were chosen as the sample of the study. One class was assigned as the experimental group, and the other class served as the control group. Each group consisted of 25 students, resulting in a total sample of 50 participants. The selection of participants was based on their similar academic background, English proficiency level, and course content to ensure comparability between the two groups.

Research Instrument

The main instrument used in this study was a writing test administered in the form of pre-test and post-test. Students were asked to write an academic paragraph or short essay based on a given topic relevant to their academic writing course.

The writing test was assessed using an analytic scoring rubric adapted from standard academic writing assessment criteria, including: (1) Content, (2) Organization, (3) Vocabulary, (4) Grammar, (5) Mechanics. Each component was scored to determine the overall writing performance of the students. In addition to the writing test, observation sheets were used to monitor students' engagement during the learning process, particularly in the experimental group where ChatGPT was integrated into writing instruction.

Procedure of Data Collection

Data collection was carried out in several stages. First, a pre-test was administered to both the experimental and control groups to assess students' initial academic writing ability and determine whether the two groups had relatively similar levels of writing competence before the intervention. Following the pre-test, the treatment phase was conducted over several meetings during the academic writing course. The experimental group received ChatGPT-assisted writing instruction, in which students were guided to use ChatGPT for generating ideas, supporting draft development, revising sentences, checking grammar, and organizing paragraphs. In contrast, the control group received conventional writing instruction through traditional teaching methods, including teacher explanations, textbook-based exercises, and manual feedback without the use of AI tools.

After the treatment period, both groups were given a post-test consisting of a writing task with a difficulty level comparable to that of the pre-test. The post-test aimed to measure students' improvement in academic writing after experiencing different instructional

approaches. In addition to the tests, documentation was collected to support and strengthen the research findings. The documentation included students' writing samples, classroom observation notes, and lesson plans, which provided additional evidence regarding the implementation of the instructional treatments and students' writing development throughout the study.

Technique of Data Analysis

The collected data were analyzed quantitatively using descriptive and inferential statistical procedures. Descriptive statistics were first employed to summarize students' academic writing performance by calculating the mean scores, standard deviations, highest scores, and lowest scores of both the pre-test and post-test results. This analysis provided an overview of students' writing abilities before and after the implementation of the instructional treatments, allowing the researcher to identify patterns of improvement in each group.

Furthermore, inferential statistics were applied to test the research hypothesis and determine the effectiveness of ChatGPT-assisted writing instruction. A paired-sample t-test was used to examine the improvement within each group by comparing pre-test and post-test scores, while an independent-sample t-test was conducted to compare the post-test results between the experimental and control groups. The study tested two hypotheses: the null hypothesis (H_0), which stated that ChatGPT-assisted writing has no significant effect on EFL students' academic writing skills, and the alternative hypothesis (H_1), which stated that ChatGPT-assisted writing has a significant effect on EFL students' academic writing skills. A significance level of 0.05 was established. If the obtained p-value was less than 0.05, the null hypothesis was rejected and the alternative hypothesis was accepted, indicating a statistically significant effect of ChatGPT-assisted writing on students' academic writing performance.

FINDINGS AND DISCUSSION

This study aimed to investigate the effect of ChatGPT-assisted writing on EFL students' academic writing skills. The research was conducted using a quasi-experimental design involving two groups: the experimental group and the control group. The experimental group received writing instruction using ChatGPT-assisted writing, while the control group received conventional writing instruction without AI support. Both groups were given a pre-test before the treatment and a post-test after the treatment. The writing scores were analyzed to determine whether there was a significant improvement in students' academic writing performance.

Descriptive Statistics of Pre-test and Post-test Scores

Experimental Group

The experimental group consisted of 25 students who received ChatGPT-assisted writing treatment. The students' writing performance was measured before and after the treatment using pre-test and post-test.

Table 1. The Students' Writing Performance In Experimental Group

No	Pre-test	Post-test
1	62	78
2	65	80
3	60	75
4	63	79
5	66	82
6	64	81
7	61	77
8	67	84
9	62	79
10	65	83
11	63	80
12	60	76
13	66	85
14	64	81

15	62	78
16	61	77
17	63	79
18	65	82
19	66	84
20	64	80
21	62	78
22	63	79
23	61	76
24	65	82
25	64	81

Based on the table above, the average pre-test score of the experimental group was 63.28, while the average post-test score increased significantly to 79.84. This indicates that students showed considerable improvement after receiving ChatGPT-assisted writing instruction. The highest pre-test score was 67, while the highest post-test score reached 85. The lowest pre-test score was 60, and the lowest post-test score was 75. This improvement suggests that the use of ChatGPT contributed positively to students' academic writing development.

Control Group

The control group consisted of 25 students who received conventional writing instruction without the use of AI tools.

Table 2. The Students' Writing Performance In experimental Group

No	**Pre-test**	**Post-test**
1	61	68
2	63	70
3	60	67
4	62	69
5	64	71
6	63	70
7	59	66
8	65	72
9	61	68
10	64	71
11	62	69
12	60	66
13	65	72
14	63	70
15	61	68
16	60	67
17	62	69
18	64	71
19	65	72
20	63	70
21	61	68
22	62	69
23	60	66
24	64	71
25	63	70

The average pre-test score of the control group was 62.32, while the average post-test score increased to 69.20. Although improvement occurred, it was smaller compared to the experimental group. The highest post-test score in the control group was 72, while the lowest was 66. This result indicates that conventional instruction improved students' writing performance, but not as significantly as ChatGPT-assisted writing.

Table. 3 Descriptive Statistics of Students' Writing Performance

Group	**Test**	**Mean**	**Standard Deviation**	**Gain Score**
Experimental	Pre-test	63.28	2.05	

Experimental	Post-test	79.84	2.73	16.56
Control	Pre-test	62.32	1.80	
Control	Post-test	69.20	1.95	6.88

The table presents a comparison of the mean scores, standard deviations, and gain scores between the experimental and control groups. In the experimental group, the mean pre-test score was 63.28 with a standard deviation of 2.05, indicating relatively similar initial writing abilities among students. After the treatment, the mean post-test score increased significantly to 79.84, with a slightly higher standard deviation of 2.73, suggesting some variation in improvement but overall strong progress. The gain score of 16.56 reflects a substantial improvement in students' academic writing skills following the use of ChatGPT-assisted writing. In contrast, the control group showed a smaller improvement, with the mean score increasing from 62.32 (SD = 1.80) in the pre-test to 69.20 (SD = 1.95) in the post-test, resulting in a gain score of 6.88. The relatively low standard deviations in both groups indicate that the scores were consistently distributed. Overall, the experimental group outperformed the control group, demonstrating that ChatGPT-assisted writing had a more significant impact on improving students' academic writing skills compared to conventional instruction.

Paired Sample t-Test

The paired sample t-test was conducted to determine whether there was a significant improvement within each group from pre-test to post-test.

Table 4 The Paired Sample T-Test Result

Group	Mean pre-test	Mean post-test	Sig. (2-tailed)
Experimental	63.28	79.84	0.000
Control	62.32	69.20	0.001

The table shows that both groups experienced improvement after treatment. However, the experimental group showed a much greater increase than the control group. Since the significance value of both groups was less than 0.05, it can be concluded that there was a significant improvement in students' writing scores after the treatments.

Independent Sample t-Test

The independent sample t-test was used to compare the post-test scores of the experimental and control groups.

Table 5. The Independent Sample T-Test Result

Group	Mean Post-test	Sig. (2-tailed)
Experimental	79.84	0.000
Control	69.20	

The significance value (0.000) was lower than 0.05, indicating that there was a significant difference between the post-test scores of the two groups. This means that students who learned through ChatGPT-assisted writing performed significantly better than those who learned through conventional writing instruction. Therefore, the alternative hypothesis (H_1) was accepted, and the null hypothesis (H_0) was rejected. Thus, it can be concluded that ChatGPT-assisted writing has a significant positive effect on EFL students' academic writing skills.

Discussion

The findings of this study revealed that ChatGPT-assisted writing significantly improved students' academic writing skills. The experimental group showed a greater increase in writing performance compared to the control group, indicating that the integration

of AI tools in writing instruction can provide meaningful pedagogical benefits for EFL learners.

One of the main reasons for this improvement is that ChatGPT provides immediate and personalized feedback during the writing process. Students were able to receive instant assistance in grammar correction, vocabulary selection, sentence structure improvement, and idea development. This helped them revise their writing more effectively than relying solely on delayed teacher feedback. As stated by Song & Song (2023), ChatGPT enhances writing motivation and academic writing skills by creating interactive learning experiences and reducing students' writing anxiety.

The results also support the findings of Alkamel & Alwagieh (2024), who found that ChatGPT improves academic writing performance among university EFL students by helping them generate ideas and organize academic texts more clearly. In this study, students in the experimental group demonstrated stronger paragraph coherence, better grammar accuracy, and more developed content after using ChatGPT-assisted writing activities.

Another important finding is that students became more confident and independent during the writing process. Instead of waiting for teacher correction, they actively interacted with ChatGPT to revise drafts and improve language use. This aligns with Fathi & Rahimi (2026), who explain that AI-enhanced writing mediation supports learner autonomy and deeper engagement in writing tasks.

However, the study also acknowledges concerns related to overdependence on AI tools. Some students tended to rely too much on AI-generated suggestions rather than developing original ideas independently. This issue supports the argument of Deep & Chen (2025), who warn that excessive dependence on AI may reduce critical thinking and originality in academic writing. Therefore, lecturers should guide students in using ChatGPT ethically and critically as a support tool rather than a replacement for their own intellectual effort.

Compared to the control group, students who received conventional writing instruction improved only slightly. Traditional teaching methods often depend on teacher-centered feedback and limited classroom practice, which may not provide sufficient opportunities for immediate revision and individualized support. This explains why the control group showed lower writing improvement. Overall, the findings confirm that ChatGPT-assisted writing is an effective instructional strategy for improving academic writing skills among EFL students. The integration of AI in writing classrooms should be carefully designed to balance technological support, critical thinking, and academic integrity. This study contributes to the growing literature on AI-assisted language learning and provides practical implications for English lecturers in higher education.

CONCLUSIONS

This study demonstrates that ChatGPT-assisted writing has a significant positive effect on EFL students' academic writing performance. Although both the experimental and control groups showed improvement, students who received ChatGPT-assisted instruction achieved substantially greater progress, as reflected in their higher post-test scores. Statistical analyses confirmed these findings, with the paired-sample t-test indicating significant improvement within each group and the independent-sample t-test revealing a significant difference between the groups after the treatment ($p < 0.05$). These results suggest that integrating ChatGPT into writing instruction can effectively support students' writing development. From a pedagogical perspective, ChatGPT provides valuable assistance through real-time feedback, grammar correction, vocabulary enhancement, idea generation, and text organization, enabling students to become more confident, engaged, and autonomous writers. However, the effective use of AI requires appropriate guidance and supervision to prevent overreliance on generated content. Therefore, ChatGPT should be utilized as a complementary learning tool that supports, rather than replaces, students' critical thinking, creativity, and independent writing skills.

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