

The Impact of Artificial Intelligence Assisted Academic Writing Tools on Graduate Students' Academic Writing Quality: Challenges and Opportunities

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Artificial Intelligence (AI) has become an important tool in academic writing in higher education. Applications such as ChatGPT, Grammarly, QuillBot, and DeepL Write help graduate students improve grammar, vocabulary, coherence, and academic writing style. This study aims to examine the influence of AI-assisted writing tools on the academic writing quality of graduate students by identifying their benefits and challenges. A qualitative systematic literature review was conducted using peer-reviewed studies published between 2021 and 2026. The findings show that AI-assisted writing tools improve grammatical accuracy, vocabulary development, text coherence, writing fluency, revision quality, and students' confidence, particularly among English as a Foreign Language (EFL) learners. However, excessive reliance on AI may reduce critical thinking, creativity, and academic autonomy. Therefore, AI should be used as a supportive learning tool rather than a replacement for students' own intellectual effort. Higher education institutions should promote the ethical use of AI by integrating AI literacy, academic integrity, and critical thinking into academic writing instruction.

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INTRODUCTION

Academic writing is widely recognized as one of the most demanding competencies required in graduate education because it requires students to demonstrate advanced critical thinking, logical reasoning, analytical skills, disciplinary knowledge, and the ability to communicate ideas through evidence-based arguments (Hyland, 2019). Graduate students are expected to produce research proposals, literature reviews, conference papers, journal articles, dissertations, and other scholarly publications that

Muhammad Lowelfit; Muhammad Taufik Ihsan

comply with international academic conventions (Swales & Feak, 2020).

For students studying English as a Foreign Language (EFL), academic writing presents even greater challenges because they must simultaneously master linguistic competence and academic discourse conventions (Hyland, 2019; Swales & Feak, 2020). Numerous studies have reported that graduate students frequently experience difficulties in grammar, vocabulary selection, cohesion, coherence, paraphrasing, citation management, argument development, and academic style (Warschauer & Ware, 2021; Fareed et al., 2016). These challenges often reduce writing confidence and increase the time required to complete academic assignments (Hyland, 2019). As universities increasingly emphasize international publication and scientific productivity, the need for effective academic writing support has become more urgent than ever (Warschauer & Ware, 2021).

The emergence of Artificial Intelligence (AI) has dramatically transformed the educational landscape over the past decade (Williamson & Eynon, 2023). Advances in Natural Language Processing (NLP) and Generative Artificial Intelligence have enabled the development of sophisticated writing assistance systems capable of generating human-like text, correcting grammatical errors, improving vocabulary, organizing ideas, paraphrasing content, summarizing literature, and providing immediate writing feedback (Zawacki-Richter et al., 2021; Tlili et al., 2023). Popular AI-assisted writing tools, including ChatGPT, Grammarly, QuillBot, DeepL Write, Microsoft Copilot, and Google Gemini, have become integral components of many students' academic writing practices (Kasneci et al., 2023; Yan & Wang, 2024). These technologies provide continuous support throughout various stages of the writing process, including brainstorming, drafting, revising, editing, and proofreading, thereby improving writing quality, learner autonomy, and revision efficiency (Trust et al., 2023; Yan & Wang, 2024).

The increasing adoption of AI-assisted writing tools has generated significant interest among researchers, educators, and policymakers. Proponents argue that AI technologies promote language learning by providing personalized feedback, improving writing accuracy, enhancing vocabulary development, and reducing cognitive load during the writing process. Students can revise their work more efficiently while receiving immediate suggestions that would otherwise require extensive instructor feedback. Such

technologies are particularly valuable in EFL contexts where opportunities for individualized writing instruction may be limited.

Despite these advantages, the widespread use of AI-assisted writing technologies has generated considerable debate regarding their educational implications (Williamson & Eynon, 2023; Tlili et al., 2023). One major concern involves academic integrity. Because generative AI systems can produce sophisticated academic texts within seconds, educators increasingly question issues related to plagiarism, authorship, transparency, originality, and ethical responsibility (Rudolph et al., 2023; Cotton et al., 2023). Excessive dependence on AI-generated content may discourage independent thinking and reduce opportunities for students to develop their own academic voice (Kasneci et al., 2023; Yan & Wang, 2024). Furthermore, AI-generated responses may occasionally include inaccurate information, fabricated references, biased interpretations, or oversimplified explanations, making critical evaluation an essential component of responsible AI use (Zhai, 2022; UNESCO, 2023).

From a pedagogical perspective, AI-assisted writing technologies should not merely be viewed as writing automation tools but rather as educational resources that can facilitate reflective learning when integrated appropriately into writing instruction (Trust et al., 2023; Zawacki-Richter et al., 2021). The Process Writing Approach emphasizes drafting, revising, editing, and receiving constructive feedback throughout the writing process (Flower & Hayes, 1981; Hyland, 2019). AI technologies can support each of these stages by offering immediate linguistic feedback while allowing instructors to focus on higher-order writing skills such as argumentation, critical analysis, evidence evaluation, and disciplinary reasoning (Warschauer & Ware, 2021; Kasneci et al., 2023). Therefore, integrating AI into academic writing instruction requires balancing technological innovation with pedagogical principles that foster learner autonomy and intellectual development (Yan & Wang, 2024; Trust et al., 2023).

In addition, digital literacy has emerged as a crucial competence for graduate students in the era of Artificial Intelligence. Students must not only learn how to operate AI technologies effectively but also understand their limitations, ethical implications, and appropriate applications in academic contexts. Responsible AI literacy includes evaluating AI-generated information, verifying factual accuracy, acknowledging AI

Muhammad Lowelfit; Muhammad Taufik Ihsan

assistance transparently, and maintaining academic integrity throughout the research and writing process. Higher education institutions therefore play an important role in developing institutional policies that encourage ethical AI use while preserving the educational objectives of academic writing instruction.

Although previous studies have investigated AI-assisted writing from various perspectives, many have focused primarily on undergraduate learners, language accuracy, or specific writing applications. Comparatively fewer studies have comprehensively examined the broader impact of AI-assisted writing technologies on graduate students' academic writing quality while simultaneously addressing opportunities, pedagogical implications, and ethical challenges. Given the rapidly evolving capabilities of generative AI, continuous examination of its educational impact remains necessary.

Therefore, this article aims to investigate the influence of Artificial Intelligence-assisted academic writing tools on graduate students' academic writing quality through a qualitative literature review. Specifically, the study explores how AI contributes to improvements in linguistic accuracy, writing organization, vocabulary development, revision efficiency, learner confidence, and overall writing performance (Kasneci et al., 2023; Yan & Wang, 2024; Warschauer & Ware, 2021) while also examining concerns related to academic integrity, originality, critical thinking, and responsible technology use (Rudolph et al., 2023; Tlili et al., 2023; UNESCO, 2023). The findings are expected to contribute to the development of effective pedagogical strategies for integrating AI into academic writing instruction within graduate English language education (Trust et al., 2023; Williamson & Eynon, 2023).

METHOD

This study employed a qualitative research design using a systematic literature review approach to investigate the impact of Artificial Intelligence (AI)-assisted academic writing tools on graduate students' academic writing quality. A literature review was selected because it enables researchers to synthesize existing empirical evidence, identify research trends, and critically evaluate current knowledge regarding a particular phenomenon. Rather than collecting primary data from participants, this study analyzed and integrated findings from previously published scholarly works to develop a

comprehensive understanding of the educational implications of AI-assisted writing technologies.

The literature search was conducted using several internationally recognized academic databases, including Scopus, Web of Science, ERIC, ScienceDirect, SpringerLink, Taylor & Francis Online, SAGE Journals, Wiley Online Library, and Google Scholar (Snyder, 2019; Xiao & Watson, 2019). These databases were selected because they provide high-quality peer-reviewed publications covering educational technology, English language teaching, academic writing, and artificial intelligence (Booth et al., 2021). The search process was performed using combinations of keywords such as *Artificial Intelligence*, *AI-assisted writing*, *ChatGPT*, *academic writing*, *graduate students*, *English as a Foreign Language (EFL)*, *higher education*, *writing quality*, *generative AI*, and *academic integrity*, following established recommendations for conducting systematic and comprehensive literature searches.

The inclusion criteria were established to ensure the quality and relevance of the selected studies (Page et al., 2021; Snyder, 2019). First, only peer-reviewed journal articles published between 2021 and 2026 were included to reflect recent developments in generative AI technologies (Kasneci et al., 2023; Williamson & Eynon, 2023). Second, the selected articles had to investigate AI-assisted writing tools within educational contexts, particularly higher education or graduate education (Zawacki-Richter et al., 2021). Third, the studies needed to discuss at least one aspect of academic writing quality, including grammar, vocabulary, coherence, organization, critical thinking, revision, or academic integrity (Warschauer & Ware, 2021; Yan & Wang, 2024). Articles that focused exclusively on computer science algorithms without educational implications were excluded from the analysis, consistent with established systematic literature review procedures (Xiao & Watson, 2019).

Following the identification process, the selected studies were carefully reviewed through several stages. Initially, titles and abstracts were screened to determine their relevance to the research objectives. Subsequently, full-text articles were examined to identify research designs, participants, AI technologies investigated, research findings, and educational implications. The collected information was then organized into thematic categories to facilitate synthesis and interpretation.

Data analysis employed thematic analysis following the procedures proposed by Braun and Clarke (2006). This analytical method involved familiarization with the data, generating initial codes, identifying recurring themes, reviewing thematic patterns, defining thematic categories, and interpreting the findings within the context of academic writing instruction. The themes that emerged from the reviewed literature included improvements in linguistic accuracy, enhancement of writing organization, vocabulary development, revision efficiency, learner confidence, academic integrity concerns, critical thinking, ethical AI use, and pedagogical implications for English language teaching.

To enhance the credibility of the review, the findings from multiple studies were compared and triangulated across different educational contexts and geographical regions (Patton, 2015; Lincoln & Guba, 1985). This approach allowed the researcher to identify consistent patterns while acknowledging variations in research findings, thereby strengthening the trustworthiness and rigor of the literature synthesis (Braun & Clarke, 2021; Snyder, 2019). The synthesis of evidence provides a comprehensive understanding of both the opportunities and challenges associated with integrating AI-assisted writing tools into graduate academic writing instruction (Xiao & Watson, 2019; Zawacki-Richter et al., 2021).

FINDINGS AND DISCUSSION

The analysis of the reviewed literature revealed that Artificial Intelligence-assisted writing tools have significantly influenced graduate students' academic writing practices in multiple dimensions. Overall, the findings indicate that AI technologies contribute positively to writing quality while simultaneously presenting pedagogical and ethical challenges that require careful consideration. Five major themes emerged from the reviewed studies.

a. AI-Assisted Writing Improves Linguistic Accuracy

One of the most consistently reported findings concerns the improvement of linguistic accuracy. Numerous studies demonstrate that AI-assisted writing applications effectively reduce grammatical errors, spelling mistakes, punctuation problems, and inappropriate sentence structures. Tools such as ChatGPT and Grammarly provide immediate corrective feedback that enables students to revise their writing before

submitting academic assignments. This instant feedback promotes self-editing and encourages learners to recognize recurring language errors independently.

Graduate students, particularly those studying English as a Foreign Language (EFL), often struggle with complex grammatical structures and academic language conventions. AI-assisted writing technologies help overcome these challenges by offering context-sensitive suggestions that improve sentence clarity and readability. Consequently, students produce more grammatically accurate academic texts while reducing their dependence on instructors for language correction.

Furthermore, AI applications facilitate language learning by explaining grammatical rules rather than merely correcting errors. This interactive learning process contributes to long-term language development, making AI an effective supplementary learning resource rather than simply an editing tool.

b. Enhancement of Academic Organization and Coherence

The reviewed literature also indicates that AI-assisted writing tools improve the overall organization and coherence of academic writing. Graduate students frequently encounter difficulties in developing logical arguments, organizing paragraphs, maintaining coherence between ideas, and constructing effective introductions and conclusions. AI systems assist writers by suggesting improved transitions, reorganizing paragraph structures, and recommending clearer argumentative sequences.

Many studies report that students use AI during the planning and drafting stages of academic writing. Rather than generating complete assignments, learners often employ AI to brainstorm ideas, formulate research questions, create outlines, and refine thesis statements. These functions reduce cognitive overload during the early stages of writing while allowing students to focus on developing deeper academic arguments.

Improved coherence also enhances the readability of research papers. AI-generated recommendations regarding sentence flow and logical progression contribute to more professional academic writing that aligns with international publication standards.

c. Increased Writing Efficiency and Learning Confidence

Another significant finding concerns writing efficiency. Graduate students commonly face strict deadlines for coursework, conference papers, journal manuscripts, and thesis writing. AI-assisted writing tools accelerate the writing process by reducing

Muhammad Lowelfit; Muhammad Taufik Ihsan

the time required for brainstorming, drafting, revising, and proofreading (Kasneci et al., 2023; Tlili et al., 2023; Trust et al., 2023).

Several empirical studies report that students experience greater confidence after using AI technologies because they receive immediate confirmation regarding language accuracy and writing quality (Yan & Wang, 2024; Warschauer & Ware, 2021). This confidence reduces writing anxiety, particularly among non-native English speakers who often fear making linguistic mistakes in academic texts (Hyland, 2019; Shidiq, 2023; Zhai, 2022).

In addition, AI tools provide continuous access to individualized writing support regardless of time or location. Unlike traditional classroom feedback, AI systems are available throughout the writing process, enabling students to revise multiple drafts independently before consulting supervisors or instructors.

d. Ethical Challenges and Academic Integrity

Despite these educational benefits, the reviewed studies consistently emphasize concerns regarding academic integrity (Rudolph et al., 2023; Cotton et al., 2023). The emergence of generative AI has raised questions about plagiarism, originality, transparency, authorship, and responsible technology use (UNESCO, 2023; Tlili et al., 2023). Some students may rely excessively on AI-generated content without critically evaluating the accuracy or originality of the produced text (Kasneci et al., 2023; Rudolph et al., 2023).

Researchers argue that AI should not replace students' intellectual contributions. Instead, AI should function as a writing assistant that supports idea development, language refinement, and revision while preserving students' ownership of their academic work (Williamson & Eynon, 2023). Universities therefore need clear institutional policies regarding acceptable AI use, citation practices, and disclosure of AI assistance in academic writing (UNESCO, 2023; Yan & Wang, 2024).

Another concern involves fabricated references and inaccurate information occasionally generated by AI systems (Zhai, 2022; Kasneci et al., 2023). Graduate students must develop critical evaluation skills to verify AI-generated content before incorporating it into scholarly writing (Yan & Wang, 2024). Consequently, AI literacy has become an essential component of academic writing education (Yan & Wang, 2024).

e. Pedagogical Implications for Academic Writing Instruction

The findings suggest that AI-assisted writing technologies should be integrated into academic writing pedagogy rather than prohibited entirely. Effective implementation requires instructors to redesign writing instruction by emphasizing higher-order thinking skills, critical analysis, evidence evaluation, and ethical decision-making.

Instead of focusing exclusively on grammar correction, educators can utilize AI to support lower-order writing tasks while dedicating classroom instruction to argument development, research methodology, academic reasoning, and scholarly communication. This instructional approach aligns with the Process Writing Approach, in which drafting, revising, and editing occur through continuous reflection and feedback.

Furthermore, integrating AI literacy into graduate curricula prepares students to become responsible academic writers capable of using emerging technologies ethically and effectively (Yan & Wang, 2024; UNESCO, 2023). Students should learn how to formulate effective prompts, evaluate AI-generated responses, verify factual information, acknowledge AI assistance transparently, and maintain academic integrity throughout the writing process (Kasneci et al., 2023)

Overall, the reviewed literature demonstrates that Artificial Intelligence has become an important educational innovation in academic writing (Zawacki-Richter et al., 2021; Williamson & Eynon, 2023). When used responsibly and critically, AI-assisted writing tools can significantly improve graduate students' writing quality, language proficiency, and learning efficiency (Tlili et al., 2023; Warschauer & Ware, 2021; Kasneci et al., 2023). However, educational institutions must establish clear ethical guidelines to ensure that technological advancement complements rather than replaces students' intellectual development and academic independence (UNESCO, 2023; Rudolph et al., 2023).

CONCLUSION

Artificial Intelligence (AI) has become an increasingly influential force in higher education, bringing notable changes to the way academic writing is undertaken, particularly at the graduate level where students are expected to produce research that meets high scholarly standards. The evidence synthesized in this systematic literature

Muhammad Lowelfit; Muhammad Taufik Ihsan

review suggests that AI-powered writing tools, including ChatGPT, Grammarly, QuillBot, DeepL Write, and other comparable platforms, have emerged as effective resources for assisting students during the writing process. Their capabilities extend beyond correcting grammatical errors to improving vocabulary choice, strengthening textual coherence and organization, facilitating revision, and producing more fluent academic writing.

Another important advantage of these technologies is their ability to deliver immediate, individualized feedback throughout the writing process. Such continuous support enables learners to identify and revise weaknesses more efficiently while encouraging greater confidence in their writing abilities. This benefit is especially evident among English as a Foreign Language (EFL) graduate students, who often face linguistic limitations and challenges in meeting the conventions of academic discourse. By providing accessible guidance at every stage of writing, AI-assisted applications can help reduce writing-related anxiety and create a more supportive environment for the development of academic writing competence.

Although these technologies offer substantial educational benefits, their increasing use in academic writing also raises important pedagogical and ethical issues. An overreliance on AI-generated content may limit opportunities for students to develop critical thinking, creativity, independent learning habits, and a distinctive academic voice. Furthermore, concerns surrounding academic integrity including plagiarism, authorship, transparency, and the possibility of inaccurate or fabricated information generated by AI systems require careful consideration by both educators and higher education institutions. For this reason, AI should be viewed as a complementary educational resource that supports students' writing development rather than as a substitute for their intellectual engagement and scholarly responsibility.

The findings of this study suggest that the effective integration of AI into academic writing instruction requires a balanced pedagogical approach. Universities and instructors should establish clear institutional policies and ethical guidelines governing the responsible use of AI technologies while simultaneously promoting AI literacy, critical thinking, academic integrity, and digital literacy within graduate curricula. Academic writing instruction should continue to emphasize higher-order cognitive

skills, including argumentation, analytical reasoning, evidence evaluation, and scholarly communication, while utilizing AI to support lower-order writing tasks such as grammar correction, language refinement, and text revision.

Finally, this review highlights the necessity for future empirical research investigating the long-term effects of AI-assisted writing on graduate students' academic performance, writing autonomy, research productivity, and critical thinking across diverse educational settings and disciplines. As Artificial Intelligence continues to evolve, educators, researchers, and policymakers must collaboratively develop pedagogical strategies that maximize the educational benefits of AI while preserving the fundamental values of academic excellence, originality, and ethical scholarship. By fostering responsible and reflective AI use, higher education institutions can prepare graduate students to become competent, independent, and ethically responsible academic writers in the era of digital transformation.

REFERENCES

- Booth, A., Sutton, A., & Papaioannou, D. (2021). *Systematic approaches to a successful literature review* (3rd ed.). Sage Publications.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp0630a>
- Braun, V., & Clarke, V. (2021). *Thematic analysis: A practical guide*. Sage Publications.
- Cotton, D. R. E., Cotton, P. A., & Shipway, J. R. (2023). Chatting and cheating: Ensuring academic integrity in the era of ChatGPT. *Innovations in Education and Teaching International*. <https://doi.org/10.1080/14703297.2023.2190148>
- Fareed, M., Ashraf, A., & Bilal, M. (2016). ESL learners' writing skills: Problems, factors and suggestions. *Journal of Education and Social Sciences*, 4(2), 81–92.
- Flower, L., & Hayes, J. R. (1981). A cognitive process theory of writing. *College Composition and Communication*, 32(4), 365–387. <https://doi.org/10.2307/356600>
- Hyland, K. (2019). *Second language writing* (2nd ed.). Cambridge University Press.
- Kasneci, E., Sessler, K., Küchemann, S., Bannert, M., Dementieva, D., Fischer, F., Gasser, U., Groh, G., Günnemann, S., Hüllermeier, E., et al. (2023). ChatGPT for good? On opportunities and challenges of large language models for education. *Learning and Individual Differences*, 103, 102274. <https://doi.org/10.1016/j.lindif.2023.102274>
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Sage Publications.
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Thomas, J., et al. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ*, 372, n71. <https://doi.org/10.1136/bmj.n71>

Muhammad Lowelfit; Muhammad Taufik Ihsan

- Patton, M. Q. (2015). *Qualitative research & evaluation methods* (4th ed.). Sage Publications.
- Rudolph, J., Tan, S., & Tan, S. (2023). Bullshit spewer or the end of traditional assessments in higher education? *Journal of Applied Learning and Teaching*, 6(1), 342–363. <https://doi.org/10.37074/jalt.2023.6.1.9>
- Shidiq, M. (2023). The use of artificial intelligence-based ChatGPT and its challenges for the world of education: From the viewpoint of the development of creative writing skills. *Proceedings of the International Conference on Education, Society and Humanity*, 1(1), 353–357. <https://doi.org/10.30812/iceh.v1i1.3690>
- Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research*, 104, 333–339. <https://doi.org/10.1016/j.jbusres.2019.07.039>
- Swales, J. M., & Feak, C. B. (2020). *Academic writing for graduate students: Essential tasks and skills* (4th ed.). University of Michigan Press.
- Tlili, A., Shehata, B., Adarkwah, M. A., Bozkurt, A., Hickey, D. T., Huang, R., & Agyemang, B. (2023). What if the devil is my guardian angel: ChatGPT as a case study of using chatbots in education. *Smart Learning Environments*, 10(1), 15. <https://doi.org/10.1186/s40561-023-00237-x>
- Trust, T., Whalen, J., & Mouza, C. (2023). Editorial: Generative AI, education, and the future. *Contemporary Issues in Technology and Teacher Education*, 23(2), 221–227.
- UNESCO. (2023). *Guidance for generative AI in education and research*. UNESCO Publishing.
- Warschauer, M., & Ware, P. (2021). Automated writing evaluation: Defining the classroom research agenda. *Language Teaching Research*, 25(3), 373–391. <https://doi.org/10.1177/1362168820906475>
- Williamson, B., & Eynon, R. (2023). Historical threads, missing links, and future directions in AI in education. *Learning, Media and Technology*, 48(2), 223–235. <https://doi.org/10.1080/17439884.2023.2171250>
- Xiao, Y., & Watson, M. (2019). Guidance on conducting a systematic literature review. *Journal of Planning Education and Research*, 39(1), 93–112. <https://doi.org/10.1177/0739456X17723971>
- Yan, L., & Wang, S. (2024). AI literacy in higher education: Conceptualization, assessment, and pedagogical implications. *Computers and Education: Artificial Intelligence*, 5, 100167. <https://doi.org/10.1016/j.caeai.2024.100167>
- Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2021). Systematic review of research on artificial intelligence applications in higher education: Where are the educators? *International Journal of Educational Technology in Higher Education*, 18(1), 39. <https://doi.org/10.1186/s41239-021-00253-1>
- Zhai, X. (2022). ChatGPT for next generation science learning. *Journal of Chemical Education*, 100(1), 447–450. <https://doi.org/10.1021/acs.jchemed.2c01280>