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A SYSTEMATIC LITERATURE REVIEW ON THE USE OF ARTIFICIAL INTELLIGENCE TOOLS IN ENHANCING UNIVERSITY STUDENTS' ACADEMIC WRITING SKILLS

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Abstract

Artificial Intelligence (AI) technology has rapidly developed and significantly influenced higher education, particularly in academic writing instruction. This study employs a Systematic Literature Review (SLR) to examine the effectiveness of AI tools in enhancing university students' academic writing skills in English education contexts. The review followed the PRISMA framework and analyzed 32 eligible studies published between 2020 and 2026. The data were collected from several academic databases, including Google Scholar, Scopus, ScienceDirect, SpringerLink, and Taylor & Francis Online. The inclusion criteria focused on peer-reviewed studies discussing AI-assisted academic writing among university students, while unrelated and duplicate studies were excluded. The selected articles were analyzed qualitatively using thematic analysis. The findings indicate that AI tools positively contribute to students' writing performance, particularly in improving grammatical accuracy, vocabulary usage, coherence, organization, and overall writing quality. AI integration also supports learner autonomy, motivation, self-regulated learning, and iterative revision practices. Furthermore, AI tools help reduce cognitive load by assisting lower-level writing tasks, allowing students to focus more on critical thinking and idea development. However, several challenges were identified, including overreliance on AI-generated suggestions, ethical concerns regarding academic integrity, and unequal access to technology. The study concludes that AI has strong potential to function as an effective pedagogical support system that complements traditional writing instruction in higher education. Therefore, balanced implementation, ethical awareness, and continuous teacher guidance are necessary to maximize the benefits of AI in academic writing education.

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INTRODUCTION

The advancement of digital technology in the 21st century has transformed educational practices across the globe, particularly in language learning and academic writing instruction (Tucker, 2014). Higher education institutions increasingly integrate technology-based learning approaches to improve students' engagement, flexibility, and academic performance (Rashid & Muhammad, 2016). In English education, academic writing is considered one of the most essential yet challenging skills because it requires students to develop coherent arguments, apply formal academic conventions, and demonstrate critical thinking abilities. For non-native

English learners, these demands become more complex due to limitations in vocabulary, grammar mastery, sentence structure, and academic discourse competence (Imani & Habil, 2012).

To overcome these challenges, educational technology has become an important component in modern writing instruction. Among recent innovations, Artificial Intelligence (AI) has emerged as one of the most influential technologies in language education. AI-powered writing tools such as Grammarly, ChatGPT, QuillBot, automated essay scoring systems, and AI-based feedback platforms provide students with immediate assistance in grammar correction, vocabulary enhancement, sentence organization, and text coherence (Raheem et al., 2023). These technologies enable learners to revise their writing interactively and independently, encouraging continuous improvement throughout the writing process.

Previous studies have shown that AI integration in writing instruction contributes positively to students' writing achievement and learner autonomy (Zheng et al., 2024). AI tools help reduce cognitive load during writing tasks by supporting lower-level linguistic processes, allowing students to focus more on idea development and critical argumentation (Guo et al., 2023). In addition, AI-assisted learning environments promote self-regulated learning, motivation, and reflective practices through immediate and personalized feedback (Hou & Zhou, 2026). Teachers also benefit from AI systems because automated feedback can reduce repetitive correction tasks and allow instructors to focus on higher-order writing issues such as argument quality and content development (Mekheimer, 2025).

Despite these benefits, the implementation of AI in academic writing also presents several concerns. Researchers have highlighted risks related to overdependence on AI-generated suggestions, reduced critical thinking engagement, plagiarism issues, and ethical challenges associated with authorship integrity (Harati & Harati, 2024). Furthermore, unequal access to technology and differences in digital literacy may influence the effectiveness of AI-supported learning environments (Katona et al., 2025). Consequently, understanding both the advantages and limitations of AI integration is essential for developing responsible educational practices.

Despite the growing number of studies investigating the use of Artificial Intelligence (AI) in academic writing instruction, several important gaps remain evident in the existing literature (Khalifa & Albadawy, 2024). Previous studies have primarily focused on specific aspects of AI implementation, such as grammar correction, automated feedback, or students' perceptions toward particular AI platforms (Ziqi et al., 2026). Other studies mainly examine the effectiveness of individual AI tools, including ChatGPT, Grammarly, or QuillBot, within limited classroom contexts. As a result, the findings remain fragmented across different educational settings, technological applications, and research focuses.

In addition, many previous studies emphasize short-term linguistic improvement, particularly grammar accuracy and vocabulary enhancement, while relatively limited attention has been given to broader dimensions of academic writing development such as critical thinking, learner autonomy, metacognitive awareness, and higher-order writing skills. Furthermore, although ethical concerns regarding plagiarism, overreliance on AI-generated content, and academic integrity have increasingly been discussed, there is still limited synthesis regarding how these challenges influence the pedagogical effectiveness of AI-assisted writing instruction in higher education contexts.

Another limitation of previous research is that most studies investigate AI implementation separately within specific educational environments or technological platforms without providing a comprehensive overview of the overall educational implications of AI integration in academic writing instruction. Moreover, limited studies specifically synthesize findings related to university students in EFL contexts, where academic writing challenges are often more complex due to linguistic and contextual factors. Therefore, a systematic synthesis

of previous studies is necessary to identify major research trends, compare findings across studies, and provide a more comprehensive understanding of the benefits, limitations, and pedagogical implications of AI-assisted academic writing technologies.

Based on these gaps, this study aims to conduct a Systematic Literature Review (SLR) on the use of Artificial Intelligence tools in enhancing university students' academic writing skills. This review seeks to synthesize previous findings, identify research trends, and analyze the educational implications and challenges associated with AI-assisted academic writing instruction in higher education contexts.

RESEARCH METHOD

This study employed a Systematic Literature Review (SLR) design to examine the implementation of Artificial Intelligence (AI) tools in enhancing university students' academic writing skills. The SLR method was selected because the study aimed to systematically synthesize and evaluate findings from previous research regarding the educational use of AI-assisted writing technologies across different higher education contexts. Compared to empirical studies, which focus on specific participants and classroom interventions, the SLR approach enables broader exploration of research trends, pedagogical implications, benefits, and challenges identified in previous studies. In addition, a meta-analysis approach was not applied in this study because the reviewed articles employed diverse research methodologies, instruments, and educational contexts, making statistical comparison and quantitative effect-size analysis less appropriate.

The literature search was conducted using several academic databases, including Google Scholar, Scopus, ScienceDirect, SpringerLink, and Taylor & Francis Online. The search process used several keywords and keyword combinations, such as "Artificial Intelligence," "AI-assisted writing," "academic writing," "EFL writing," "Automated Writing Evaluation," "ChatGPT," "Grammarly," "QuillBot," and "writing skills." To maintain the relevance and recency of the reviewed literature, the selected studies were limited to peer-reviewed journal articles published between 2020 and 2026.

The article selection process followed several systematic stages, including identification, screening, eligibility assessment, and final inclusion. During the identification stage, articles related to AI-assisted academic writing were collected from the selected databases. After removing duplicate and irrelevant studies, the remaining articles were screened based on titles, abstracts, and keywords to determine their relevance to the research topic. The eligibility process was subsequently conducted through full-text reading using predetermined inclusion and exclusion criteria. The inclusion criteria consisted of: (1) studies discussing the implementation of AI tools in academic writing instruction, (2) studies focusing on university students or EFL learners, (3) peer-reviewed journal articles, and (4) articles written in English. Meanwhile, conference papers, unpublished manuscripts, non-academic publications, and studies unrelated to academic writing were excluded from the review. After the selection process was completed, 32 relevant articles were included in the final analysis.

The selected studies were analyzed using thematic analysis to identify recurring findings, similarities, differences, and major research trends across the reviewed literature. The analysis process consisted of several stages. First, open coding was conducted by identifying important concepts, recurring keywords, and significant findings from each selected study. Second, similar codes were grouped into broader categories based on recurring patterns identified in the literature. Third, the categorized findings were synthesized into four major themes, namely: (1) improvement of academic writing skills through AI tools, (2) cognitive benefits and learner autonomy through AI integration, (3) students' motivation and perceptions toward AI tools, and (4) challenges and limitations of AI implementation in academic writing.

To ensure the credibility and consistency of the analysis, repeated reading and cross-checking were conducted throughout the coding and categorization process. The identified themes were continuously compared across studies to ensure that the synthesized findings accurately represented the dominant patterns within the reviewed literature. Through this systematic analytical procedure, the study aimed to provide a comprehensive understanding of the pedagogical effectiveness, benefits, limitations, and educational implications of AI-assisted academic writing technologies in higher education contexts.

RESEARCH FINDINGS AND DISCUSSION

Research Findings

The integration of Artificial Intelligence (AI) within the educational landscape has advanced rapidly, particularly concerning the instruction of academic writing in higher education. AI-driven platforms, such as Grammarly, ChatGPT, and QuillBot, are increasingly utilized as essential writing aids due to their capacity to deliver rapid and automated feedback. These technological tools significantly assist students in refining grammatical accuracy, sentence structure, lexical selection, and the overall coherent organization of ideas in scholarly texts. Furthermore, the incorporation of AI fosters a more adaptable and interactive learning environment, enabling students to undertake continuous and autonomous revisions.

Numerous studies underscore the positive impacts of utilizing AI in academic writing instruction, noting notable enhancements in students' writing proficiency, cognitive development, learning motivation, and learner autonomy. Nevertheless, the implementation of AI in educational settings is accompanied by significant challenges, including concerns regarding academic integrity, over-reliance on technology, and disparities in digital literacy. Consequently, it is imperative to comprehensively understand the role of AI in facilitating academic writing, alongside its associated advantages and limitations. Drawing upon these empirical findings, the discourse surrounding the application of AI tools to enhance academic writing skills can be categorized into the following primary dimensions:

Table 1. Previous Studies on AI-Assisted Academic Writing

No	Area or Focus	Authors	Insight or Riset Variable
1.	Improvement of academic writing skills	Li et al. (2024); Phillips & Paola (2015); Raheem et al. (2023); Ali (2025); Engeness & Gamlem (2025); Li et al. (2015)	Improvement in grammar accuracy, vocabulary usage, coherence, and writing organization. Provision of instant corrective feedback. Support for interactive writing environments and iterative writing practices.
2.	Cognitive benefits and learner autonomy	Feng & Mei (2022); Murtisari et al. (2025); Technol et al. (2025); Tekir (2026); Teng & Zhang (2020); Kerimbayev et al. (2023)	Reduction of cognitive load related to mechanical writing tasks. Increased focus on higher-order thinking skills, critical analysis, and logical argumentation. Enhanced metacognitive awareness and stronger self-regulated learning.
3.	Students' motivation and perceptions toward AI tools	Cui (2025); Yildiz Durak & Onan (2025); Hyland (2013); Yang & Rui (2025); Zhai et al. (2024); Dzikovska et al. (2014)	AI tools are perceived as helpful and practical for generating ideas. Increased confidence and motivation due to instant feedback. Creation of a less stressful atmosphere and reduced anxiety. Tendency for overreliance without critical evaluation.
4.	Challenges and limitations of AI implementation	Zhai et al. (2024); Tate & Warschauer (2022); Ziqi et al. (2026)	Ethical concerns such as plagiarism and academic integrity. Reduction in originality and creativity due to

	excessive dependence. Disparities caused by unequal access to technology and differences in digital literacy. Inaccurate AI-generated feedback within specific academic or cultural contexts.

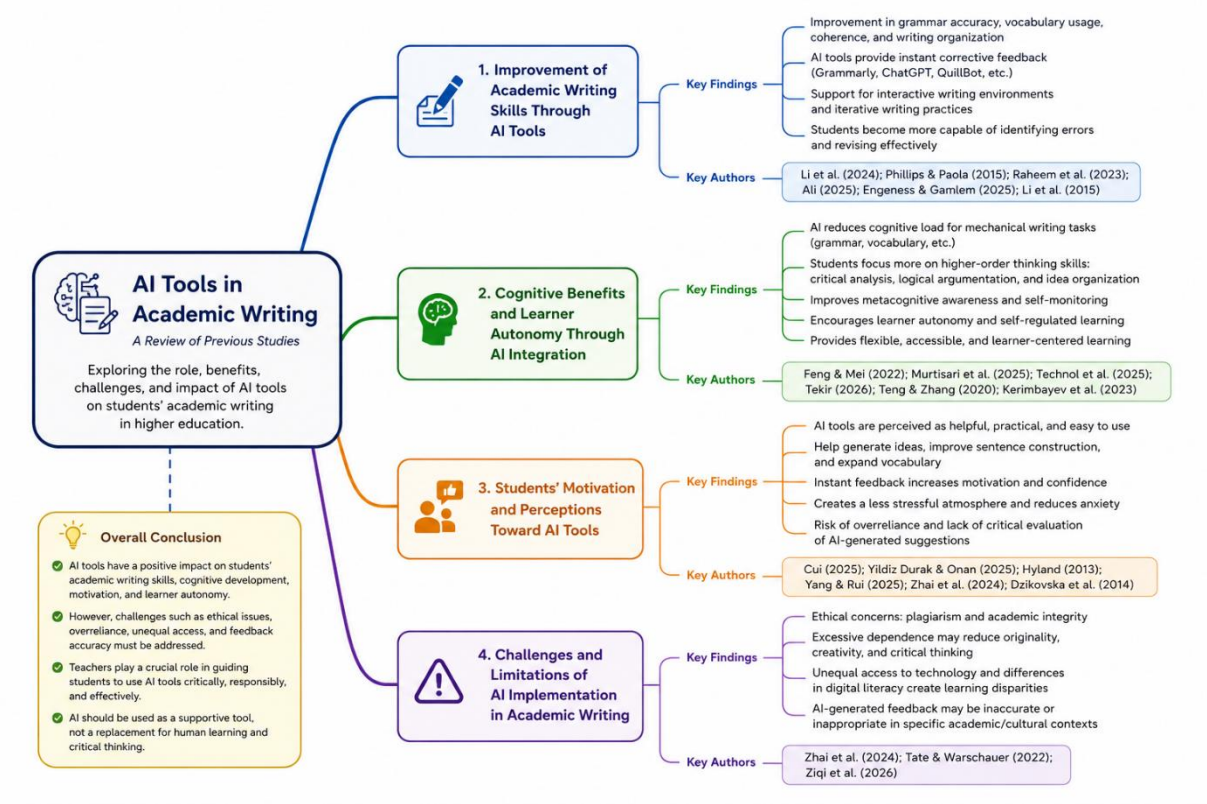


Figure 1. Mindmap of AI Tools in Academic Writing

Figure 1. The mind map illustrates the synthesis of previous studies regarding the implementation of Artificial Intelligence (AI) tools in academic writing. Overall, the reviewed literature highlights four major areas of discussion, namely the improvement of academic writing skills, cognitive benefits and learner autonomy, students' motivation and perceptions toward AI tools, as well as the challenges and limitations associated with AI integration in writing instruction.

The PRISMA-based article selection process resulted in 30 eligible studies that met the inclusion criteria for this systematic literature review. The selected studies mainly discussed the use of AI-powered writing tools such as ChatGPT, Grammarly, QuillBot, automated feedback systems, and AI-assisted learning platforms in higher education writing instruction. The reviewed studies originated from various educational contexts and consistently explored the impacts of AI integration on students' writing performance, learner autonomy, cognitive development, motivation, and ethical concerns.

The thematic analysis identified four major themes across the reviewed studies: (1) improvement of academic writing skills, (2) cognitive benefits and learner autonomy, (3) students' motivation and perceptions toward AI tools, and (4) challenges and limitations of AI implementation. These findings demonstrate that AI integration has multidimensional impacts on academic writing instruction in higher education.

The first area, Improvement of Academic Writing Skills Through AI Tools, demonstrates that AI-based applications such as Grammarly, ChatGPT, and QuillBot contribute

significantly to the enhancement of students' writing performance. Previous studies indicate that the use of AI tools improves several essential components of academic writing, including grammatical accuracy, vocabulary development, coherence, and text organization. In addition, the provision of immediate corrective feedback enables students to identify errors more effectively and revise their writing continuously, resulting in improved clarity and overall writing quality.

The second area focuses on Cognitive Benefits and Learner Autonomy Through AI Integration. Research findings suggest that AI tools function as supportive scaffolding systems that help reduce students' cognitive burden during the writing process, particularly in lower-level mechanical tasks such as grammar correction and vocabulary selection. As a result, students are able to concentrate more on higher-order thinking skills, including critical analysis, logical reasoning, and idea organization. Furthermore, continuous interaction with AI-generated feedback enhances students' metacognitive awareness and promotes self-regulated learning, leading to greater learner autonomy in academic writing activities.

The third discussion concerns Students' Motivation and Perceptions Toward AI Tools. Various studies reveal that students generally perceive AI-assisted writing platforms as practical, accessible, and beneficial for supporting the writing process. AI tools assist learners in generating ideas, constructing sentences, and improving lexical choices, which subsequently increases students' confidence and motivation in completing writing tasks. Moreover, the availability of instant feedback creates a more flexible and less stressful learning environment, particularly for students who experience anxiety during academic writing activities. Nevertheless, some studies also emphasize the potential risk of overdependence on AI-generated suggestions, as certain students may accept automated corrections without critically evaluating their appropriateness.

The final area, Challenges and Limitations of AI Implementation in Academic Writing, addresses several concerns related to the use of AI in educational settings. Ethical issues, particularly plagiarism and academic integrity, remain significant challenges in AI-assisted writing practices. Excessive reliance on AI may reduce students' originality, creativity, and critical thinking abilities. In addition, disparities in technological access and digital literacy may create unequal learning opportunities among students. Another limitation is that AI-generated feedback is not always contextually or culturally appropriate, which indicates that human supervision and instructional guidance remain necessary throughout the learning process.

In conclusion, the mind map demonstrates that AI tools provide substantial benefits for the development of academic writing skills from linguistic, cognitive, and motivational perspectives. However, the effective implementation of AI in academic writing requires balanced integration, ethical awareness, and continuous guidance from educators to ensure that AI serves as a supportive learning tool rather than a replacement for human reasoning and critical thinking.

Discussion

1. Improvement of Academic Writing Skills Through AI Tools

Various studies indicate that Artificial Intelligence (AI) tools have a significant contribution in improving university students' academic writing skills (Li et al., 2024). The aspects that showed the greatest improvement include grammar accuracy, vocabulary usage, coherence, organization, and overall writing quality (Phillips & Paola, 2015). AI-powered tools such as Grammarly, ChatGPT, and QuillBot provide immediate corrective feedback that helps students revise and refine their writing more effectively (Raheem et al., 2023). Several reviewed studies reported that students became more capable of identifying grammatical errors, improving sentence structure, and organizing ideas logically after regularly using AI-assisted writing platforms (Ali, 2025). The availability of instant feedback also supports iterative writing

practices, allowing students to continuously revise their drafts until higher levels of clarity and accuracy are achieved.

In addition, AI tools create a more interactive writing environment that encourages students to engage actively in the revision process (Engeness & Gamlem, 2025). The automatic feedback system enables learners to recognize mistakes independently and improve their writing performance without relying entirely on teacher correction (Li et al., 2015). Consequently, students become more familiar with academic writing conventions and develop stronger writing fluency over time.

Overall, AI tools demonstrate a positive impact on students' academic writing performance. The integration of AI in writing instruction allows students to practice writing in a more efficient, structured, and supportive learning environment, making the writing process more manageable and productive.

2. Cognitive Benefits and Learner Autonomy Through AI Integration

Beyond linguistic improvement, AI integration also contributes significantly to students' cognitive development during the writing process. Academic writing requires learners to manage multiple complex cognitive activities simultaneously, including idea generation, grammar control, coherence building, and critical argument development (Feng & Mei, 2022). AI tools function as scaffolding systems that reduce cognitive load by assisting students with lower-level mechanical tasks such as grammar correction and vocabulary suggestions (Murtisari et al., 2025).

Several studies reveal that the use of AI feedback enables students to focus more on higher-order thinking skills, including critical analysis, logical argumentation, and organization of ideas (Technol et al., 2025). Repeated interaction with AI-generated suggestions also increases students' metacognitive awareness, as learners gradually become more capable of evaluating and monitoring their own writing performance (Tekir, 2026). As a result, students develop stronger self-regulated learning strategies and become more independent writers (Teng & Zhang, 2020).

Furthermore, AI-assisted learning encourages students to take greater responsibility for their own academic progress. The flexibility and accessibility of AI writing tools allow students to practice writing anytime and receive immediate responses, creating a more autonomous and learner-centered learning experience (Kerimbayev et al., 2023).

3. Students' Motivation and Perceptions Toward AI Tools

In addition to improving technical writing abilities, AI tools also positively influence students' motivation and attitudes toward academic writing (Cui, 2025). Many studies report that students perceive AI-assisted writing applications as helpful, practical, and easy to use. AI tools help students generate ideas more easily, improve sentence construction, and enhance vocabulary selection, which increases students' confidence in completing writing tasks.

The availability of instant feedback is considered one of the most beneficial aspects of AI integration because it supports independent learning and encourages frequent revision (Yildiz Durak & Onan, 2025). Students become more motivated to write because they can immediately identify and correct mistakes without waiting for teacher feedback (Hyland, 2013). Moreover, AI-assisted learning environments create a less stressful atmosphere, particularly for students who often experience anxiety during academic writing activities (Yang & Rui, 2025).

However, several studies also indicate that some students tend to rely too heavily on AI-generated suggestions without critically evaluating them (Zhai et al., 2024). In some cases, learners accept corrections automatically without fully understanding the underlying linguistic or contextual reasons (Dzikovska et al., 2014). Therefore, teacher guidance remains essential

to ensure that students use AI tools critically, responsibly, and effectively within the learning process.

4. Challenges and Limitations of AI Implementation in Academic Writing

Despite the numerous benefits identified in the reviewed studies, several challenges and limitations regarding AI implementation in academic writing are consistently reported. Ethical concerns, particularly plagiarism and academic integrity, remain major issues in higher education. Excessive dependence on AI-generated content may reduce students' originality, creativity, and critical thinking abilities if AI is used inappropriately (Zhai et al., 2024).

Another important challenge relates to digital literacy and unequal access to technology. Students who have limited technological skills or inadequate internet access may experience difficulties in utilizing AI tools effectively, which can create disparities in learning outcomes (Tate & Warschauer, 2022). Additionally, AI-generated feedback is not always contextually accurate. Some AI systems may provide suggestions that are grammatically correct but inappropriate within specific academic or cultural contexts (Ziqi et al., 2026).

To address these limitations, teachers play an important role as facilitators and supervisors in the learning process. Effective implementation of AI requires balanced integration, proper instructional guidance, and ethical awareness to ensure that AI functions as a supportive educational tool rather than a replacement for human learning and critical thinking processes.

CONCLUSION

This systematic literature review concludes that Artificial Intelligence (AI) tools have a significant positive effect on university students' academic writing skills. The reviewed studies consistently show that AI-assisted writing technologies improve grammar accuracy, vocabulary use, coherence, organization, and overall writing quality. In addition, AI tools support students in revising and refining their writing through immediate feedback, which enhances the effectiveness of the writing process.

The findings also indicate that AI contributes to students' cognitive development by reducing cognitive load and helping learners focus on higher-order thinking skills such as idea development, critical analysis, and argument construction. Furthermore, AI tools promote learner autonomy and self-regulated learning, as students become more independent in evaluating and improving their own writing.

From a pedagogical perspective, AI integration changes the role of teachers from direct correctors into learning facilitators who guide students in using feedback effectively. This shift creates a more interactive and student-centered learning environment. Students also show generally positive perceptions toward AI tools, especially regarding motivation, confidence, and ease of use in writing tasks.

However, several challenges remain, including ethical issues such as plagiarism, overreliance on AI, differences in digital literacy, and unequal access to technology. These limitations indicate that AI should not replace traditional instruction but should be used as a supportive learning tool under proper guidance.

Overall, this review suggests that AI tools are effective in enhancing academic writing skills in higher education when used responsibly. Future research is recommended to explore long-term effects, different educational contexts, and strategies for integrating AI ethically and effectively in writing instruction.

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