ASIAN PENDIDIKAN
ISSN: 2735-2331, e-ISSN: 2805-4350
DOI: https://doi.org/10.53797/aspen.v4i2.7.2024

Artificial Intelligence in Academic Writing: A Literature Review

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Received 27 October 2023; Accepted 30 November 2024; Available online 02 December 2024

Abstract: Artificial intelligence (AI) has emerged as a transformative technology in education. This review focused on the intersection of AI tools and academic writing, addressing challenges such as plagiarism, language barriers, and feedback processes. The problem statement revolved around the increasing integration of AI in academic contexts, which offered opportunities for improved student learning but raised concerns over ethical issues such as plagiarism and over-dependence on AI-generated content. The purpose of this review was to critically review highly cited studies on the use of AI in academic writing, identifying AI tools and key findings. Research questions guiding this review included: 1) Which highly cited studies related to AI and academic writing, published since 2020, were identified as relevant? 2) Which AI had been utilised for academic writing? and 3) What findings had been reported in these previous studies? Methodologically, the review employed keyword searches in Google and Scopus databases to identify highly cited, open-access articles published since 2020. This resulted in the selection of 11 studies that spanned various AI tools in academic writing. Findings indicated that ChatGPT was the most frequently used AI tool, employed for tasks such as academic text generation, plagiarism detection, and language learning support. The review also highlighted ethical concerns, particularly regarding plagiarism, content accuracy, and the risk of over-reliance on AI. The implications were both theoretical and practical. Theoretically, this review demonstrated AI's expanding influence in educational theory, especially in scaffolding learning for non-native English speakers. Practically, AI tools offered personalised feedback and enhance writing outcomes, though educators must implement these tools responsibly to prevent over-reliance. In conclusion, while AI tools showed great promise in improving academic writing, future research should address ethical concerns, enhance the accuracy of AI-generated content, and develop frameworks that balance AI assistance with the promotion of critical thinking skills.

Keywords: Artificial intelligence, academic writing, literature review

1. Introduction

Artificial intelligence (henceforth, AI) has become an important technology in education. AI refers to various technologies that empower machines to emulate human cognitive functions, such as learning. In education, AI is used to enrich learning experiences, streamline administrative processes, and deliver personalised educational content. The integration of AI in education has transformed traditional methods of teaching and learning. Technologies such as machine learning, natural language processing, and robotics have been embedded to support teachers and students. Moreover, AI facilitates the design of personalised learning experiences by analysing student data and tailoring instructional content to meet individual learning needs. One notable application of AI is its role in academic writing. However, many students encounter difficulties in structuring their writing and using appropriate academic language.

To reiterate, academic writing is distinguished by its formality, precision, and reliance on evidence-based arguments. For many students, particularly those at the outset of their academic journeys, mastering it could be challenging. Common challenges include constructing a coherent argument, effectively integrating sources, and maintaining a formal tone throughout their work. Additionally, conducting literature reviews and synthesising information from various sources is often time-consuming and intellectually demanding. Students frequently struggle with issues related to plagiarism, whether intentional or inadvertent, often due to a lack of understanding of proper citation practices. AI can play a crucial role in addressing these challenges by assisting them in organising their research, checking for plagiarism, and ensuring that citations are accurate and correctly formatted.

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Following that, AI has the potential to mitigate many of the challenges associated with academic writing. It can assist at various stages of the writing process, from brainstorming to the final editing stages. For example, AI can suggest improvements in grammar, style, and clarity, aiding students in refining their writing. Additionally, it can automate citation and referencing processes, thereby reducing the likelihood of errors and plagiarism. Furthermore, it can aid in conducting literature reviews by rapidly scanning vast amounts of academic literature to identify relevant sources. This not only saves time but also enhances the effectiveness with which students synthesise information. However, despite the significant benefits of AI in enhancing the efficiency of academic writing, ethical concerns must be considered. Over-reliance on AI may hinder the development of critical thinking skills, as students might become dependent on these technologies for content generation rather than cultivating their own ideas. Therefore, AI holds considerable promise in transforming academic writing by addressing many of the challenges students face. Through providing tools that assist with everything from grammar checks to literature reviews, AI can help students enhance their writing skills and produce higher-quality academic work. To further investigate AI and academic writing, several research questions are guiding this review.

1) Which highly cited studies related to AI and academic writing, published since 2020, were identified as relevant?
2) Which AI had been utilised for academic writing?
3) What findings had been reported in these previous studies?

2. Literature Review

This section outlines the literature review on academic writing and AI. To initiate, students must be able to fluidly navigate the process of generating ideas, expressing viewpoints, synthesising and writing down thoughts, revising drafts, and ultimately producing a final composition to demonstrate proficiency in academic writing (Ariyanti, 2016). Despite extensive discussion on the processes involved in developing academic writing skills, only a small proportion of individuals perform these tasks well. Students are required not only to represent their thoughts and emotions effectively, but also to rationally connect and structure their writing in a coherent manner. It is essential that students' academic writing reflects their disciplinary knowledge and experiences while engaging and stimulating the reader (Giridharan & Robson 2011). However, academic writing is widely regarded as a challenging skill to master, particularly for students (Fareed et al., 2016). Many students struggle with fundamental writing skills, such as connecting ideas, constructing sentences, selecting appropriate vocabulary, and conveying intended meanings in writing (Kanglong & Afzaal, 2020). Furthermore, students must internalise additional aspects of academic writing, including outlining, analysing, paraphrasing, constructing sentences, and editing, while also using appropriate punctuation. Additionally, Sulaiman et al. (2017) asserted that students are expected to demonstrate proficiency in academic writing by exhibiting a strong grasp of language and vocabulary (Sulaiman et al., 2017), effective knowledge management, and a thorough understanding of writing mechanics (Hapsari & Sukavatee, 2018).

On the other hand, AI is a form of computer technology that has become increasingly prevalent among teachers and students. It is recognised for its capacity to facilitate educational processes and enhance learning outcomes (Schram, 2023). With the assistance of AI, learning has become more efficient, and it has gained popularity among students, particularly due to its ability to generate new educational resources and materials, such as teaching activities, lesson plans, and assessments. Teachers have utilised AI to have deeper insights into their students' needs. One of the key benefits of AI in education is its ability to provide enriched and meaningful learning experiences, helping students achieve their goals more effectively (Schram, 2023). AI also supports teachers by offering quicker responses, enabling them to tailor teaching strategies to meet students' needs more effectively. As AI continues to evolve, new opportunities for enhanced learning are emerging. AI, as a self-driving technology, holds the potential to transform education, unlocking new and powerful possibilities for learning (Schram, 2023).

3. Methodology

To identify relevant past studies, the keywords "artificial intelligence" and "academic writing" were employed. The process of locating pertinent articles involved several stages. Initially, a Google search using these keywords yielded 11,800 results, focusing on articles published since 2020. However, this volume of material was unmanageable. Consequently, the "allintitle" search operator was utilised to refine the results, narrowing the findings to 19 articles, most of which were indexed in Scopus. Subsequently, a search within the Scopus database identified 182 documents published since 2020 using the same keywords. To further streamline the results, the search was filtered to include only open-access articles, which reduced the number of documents to 60. Additionally, only articles with more than 10 citations were considered for further analysis. As a result, 11 articles were selected and downloaded for detailed review. A flowchart illustrating this process is presented in Fig. 1.

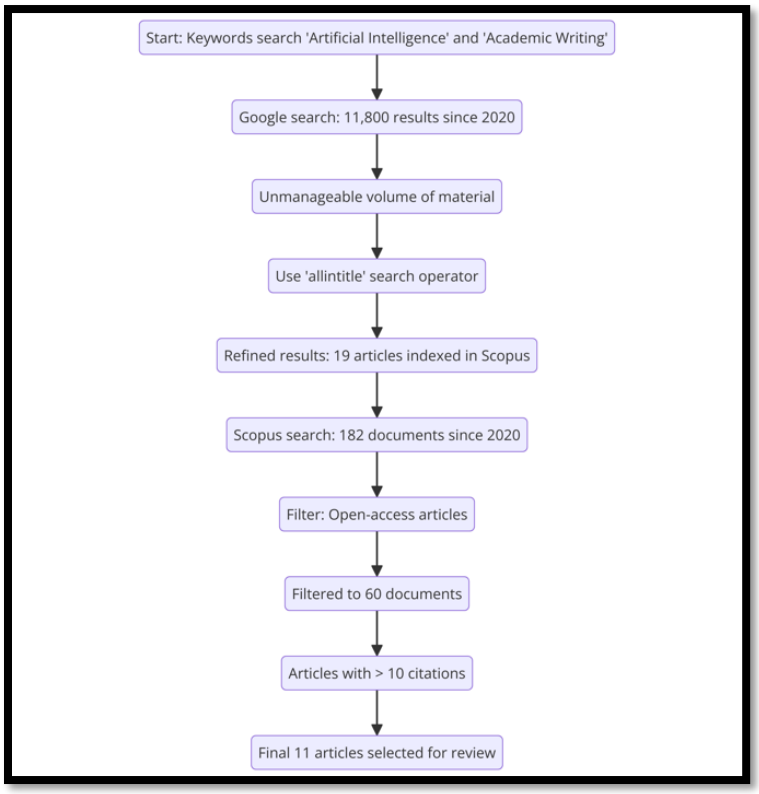

Fig. 1. Flowchart of methodology

4. Findings

4.1 Research Question 1: Which Highly Cited Studies Related to AI and Academic Writing, Published Since 2020, Were Identified as Relevant?

Eleven highly cited studies related to AI and academic writing, published since 2020, were identified as relevant to this review. These studies are presented in the table below, accompanied by a detailed elaboration. Table 1, summarises 11 highly cited studies related to AI and academic writing, published since 2020, which explore various issues, including the application of AI tools in higher education, ethical concerns, and the impact of AI on non-native English speakers. Among these, Nazari et al. (2021) conducted a randomised controlled trial to examine the role of AI-powered writing assistants in higher education. This study, published in *Heliyon*, a multidisciplinary journal, has accumulated 98 citations, underscoring its significant contribution to discussions surrounding AI's practical implications for enhancing students' writing and learning outcomes. Similarly, Jarrah et al. (2023) investigated whether the use of ChatGPT in academic writing constitutes plagiarism. Published in the *Online Journal of Communication and Media Technologies*, this paper has been cited 47 times, reflecting its importance in addressing the ethical concerns surrounding AI-assisted writing. Desaire et al. (2023), in a study published in *Cell Reports Physical Science*, explored how machine learning tools could distinguish between human and AI-generated writing with over 99% accuracy. The 37 citations garnered by this paper emphasise its relevance to discussions on academic integrity, particularly in the context of AI's growing influence in academic writing.

Following that, Malik et al. (2023), published in the *International Journal of Educational Research Open*, investigated higher education students' perspectives on AI in academic essays. With 36 citations, this study contributes to ongoing debates about the integration of AI tools in pedagogy and their impact on students' writing experiences. Additionally, Song & Song (2023), in their paper published in *Frontiers in Psychology*, assessed ChatGPT's influence on English as a Foreign Language (EFL) students. This study, with 28 citations, highlights AI's potential to enhance academic writing skills for non-native speakers. In a similar vein, Khlaif et al. (2023) examined ChatGPT's performance in scientific research, noting both its potential and limitations. Published in *JMIR Medical Education*, this study has received 27 citations, illustrating the critical examination of AI's role in scientific fields. Finally, Hwang et al. (2023), in their study published in the *Korean Journal of Radiology*, explored how non-native English-speaking researchers utilised ChatGPT to improve their academic writing. With 15 citations, this paper contributes to the growing body of research on AI's role in overcoming language barriers in academia. Overall, these studies highlight the far-reaching impact and increasing significance of AI in academic writing. The diversity of journals, including *Heliyon*, *Cell Reports Physical Science*, and *Frontiers in Psychology*, demonstrates the interdisciplinary nature of AI's application in education, ethics, and research. The wide range of topics, from plagiarism concerns to the enhancement of EFL students' writing abilities,

reflects the integral role AI now plays in academic writing. The high citation counts of these studies further underscore their influence and relevance within contemporary academic discourse.

Table 1. Relevant past studies

No.	Author(s)/Year	Title	Journal	Citation
1	Nazari et al. (2021)	Application of Artificial Intelligence powered digital writing assistant in higher education: randomized controlled trial	Heliyon	98
2	Jarrah et al. (2023)	Using ChatGPT in academic writing is (not) a form of plagiarism: What does the literature say?	Online Journal of Communication and Media Technologies	47
3	Desaire et al. (2023)	Distinguishing academic science writing from humans or ChatGPT with over 99% accuracy using off-the-shelf machine learning tools	Cell Reports Physical Science	37
4	Malik et al. (2023)	Exploring Artificial Intelligence in Academic Essay: Higher Education Student's Perspective	International Journal of Educational Research Open	36
5	Song & Song (2023)	Enhancing academic writing skills and motivation: assessing the efficacy of ChatGPT in AI-assisted language learning for EFL students	Frontiers in Psychology	28
6	Khlaif et al. (2023)	The Potential and Concerns of Using AI in Scientific Research: ChatGPT Performance Evaluation	JMIR Medical Education	27
7	Hwang et al. (2023)	Is ChatGPT a “Fire of Prometheus” for Non-Native English-Speaking Researchers in Academic Writing?	Korean Journal of Radiology	15
8	Guleria et al. (2023)	ChatGPT: ethical concerns and challenges in academics and research	Journal of Infection in Developing Countries	13
9	Conjin et al. (2023)	The Effects of Explanations in Automated Essay Scoring Systems on Student Trust and Motivation	Journal of Learning Analytics	13
10	Taskiran & Goksel (2022)	Automated Feedback and Teacher Feedback: Writing Achievement In Learning English As A Foreign Language At A Distance	Turkish Online Journal of Distance Education	12
11	Utami et al. (2023)	Utilization of artificial intelligence technology in an academic writing class: How do Indonesian students perceive?	Contemporary Educational Technology	11

4.2 Research Question 2: Which AI Had Been Utilised for Academic Writing?

This section provides an overview of the AI tools utilised in 11 previous studies. This research question aimed to identify which AI tools have been utilised in academic writing, based on two visuals that mapped the AI tools across studies and provided a frequency count. A review of these studies revealed that ChatGPT dominated the landscape of AI tools in academic writing research. This was clearly illustrated in the first visual, which showed ChatGPT being employed in six different studies, making it by far the most frequently used tool. In contrast, tools such as Grammarly, Wizard-of-Oz, and Write and Improve appeared far less frequently, each featuring in only one study. Beginning with Nazari et al. (2021), the study focused on the use of Grammarly, an AI tool designed to assist with proofreading and enhancing writing quality. This study examined the role of digital writing assistants and demonstrated Grammarly’s prominence within educational contexts. In contrast, Jarrah et al. (2023), Desaire et al. (2023), and Guleria et al. (2023) centred their research on ChatGPT, underscoring its versatility and growing importance in academia. ChatGPT was tested for various purposes, including text generation, academic task assistance, and ethical evaluations, highlighting its significant impact on contemporary academic writing. Similarly, Song & Song (2023) and Hwang et al. (2023) utilised ChatGPT to support non-native speakers in their writing and to overcome language barriers in academic research, demonstrating its value across linguistic and educational contexts. Fig. 2 and Fig. 3 are presented accompanied by detailed explanations to enhance understanding of the findings.

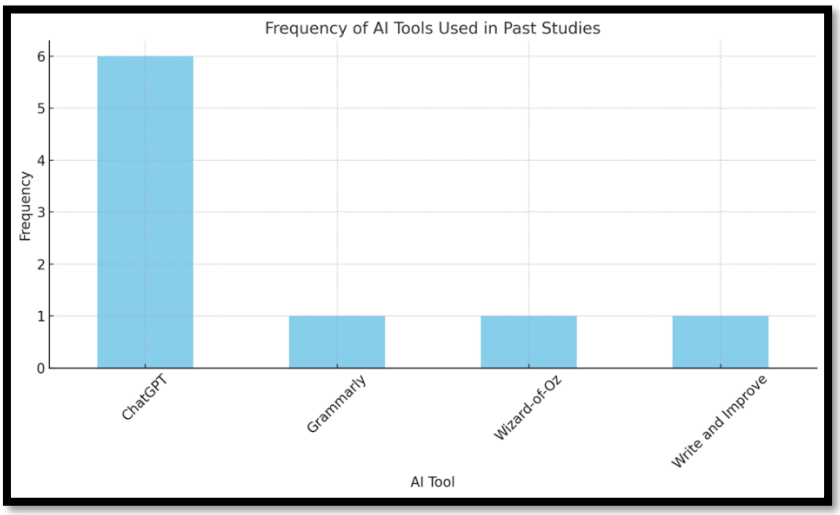

Fig. 2. Frequency of AI tools used in past studies

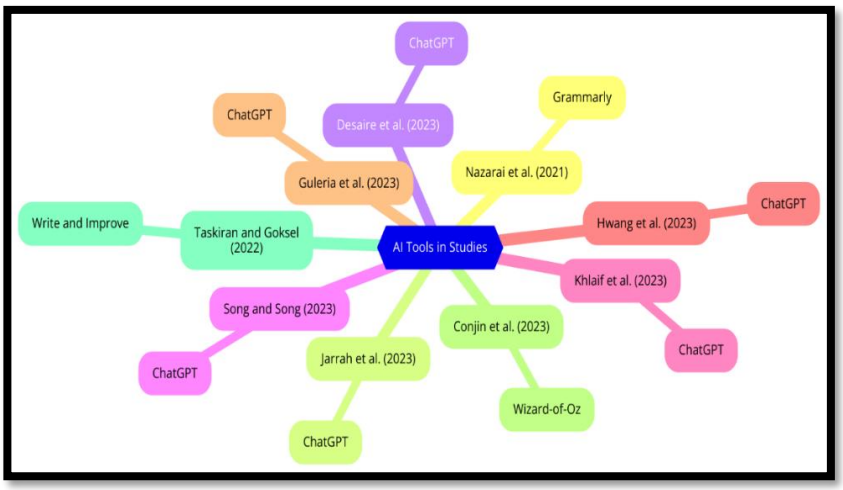

Fig. 3. AI tools used

Conversely, Conjin et al. (2023) employed the Wizard-of-Oz automated essay grading system, which represents a different type of AI technology, focusing on assessment rather than writing support. The inclusion of this grading system highlights the diversity of AI tools used in academic research. Taskiran & Goksel (2022) utilised Write and Improve, a less prominent AI tool specifically aimed at providing writing feedback and enhancing language learning at a distance. This reflects the specific needs of certain studies and the broad range of AI applications in education.

Interestingly, some studies, such as Malik et al. (2023) and Utami et al. (2023), did not focus on specific AI tools but rather explored general perceptions or listed generic AI functions. For instance, Utami et al. (2023) discussed two tools with distinct functions, such as “conclusion writer,” “idea generator,” and “text summariser,” without naming specific AI products, indicating the expanding toolkit available to assist with academic writing tasks. Overall, ChatGPT emerged as the most frequently used AI tool in recent academic writing research, likely due to its multifunctional capabilities and ease of integration into various writing and research tasks. However, other tools such as Grammarly and Wizard-of-Oz continue to serve niche roles, depending on the specific requirements of the research. The visual representations emphasised this trend, with ChatGPT being extensively utilised across multiple studies, while other tools appeared less frequently but maintained significance within their respective contexts.

4.3 Research Question 3: What Findings Had Been Reported in These Previous Studies?

This section reports the findings of each study. First and foremost, Nazari et al. (2021) examined the efficacy of a group format of an AI writing tool for postgraduate students, for whom English was a second language, within the context of English academic writing. In this study, 120 students were randomly assigned either to an AI-equipped group (n = 60) or a non-AI-equipped group (NEAI). The results of the parametric test of covariance analysis revealed that, post-intervention, students who participated in the AI intervention group showed a statistically significant improvement in behavioural engagement (Cohen's d = .75, 95% CI [0.38, 1.12]), emotional engagement (Cohen's d = .82, 95% CI [0.45, 1.25]), cognitive engagement (Cohen's d = .39, 95% CI [0.04, .76]), self-efficacy in writing (Cohen's d = .54, 95% CI [0.18,

0.91]), positive emotions (Cohen's d = .44, 95% CI [0.08, 0.80]), and a reduction in negative emotions (Cohen's d = −.98, 95% CI [−1.36, −0.60]) compared to the NEAI group. These findings suggest that AI writing tools can serve as an effective mechanism for promoting learning behaviour and enhancing attitudinal acceptance of technology through formative feedback and assessment, specifically for non-native postgraduate students in English academic writing. On the other hand, Jarrah et al. (2023) conducted a comprehensive review of the existing literature on the use of ChatGPT in academic writing, focusing particularly on its implications for plagiarism. The review offered a synthesis of studies that explored the use of ChatGPT in academic writing and its potential link to plagiarism. The findings contribute to a deeper understanding of both the usage and potential misuse of ChatGPT in academic contexts, amidst growing concerns regarding plagiarism in higher education. The results suggest that, while ChatGPT can be a valuable tool for academic writing, it is imperative to adopt responsible practices to maintain academic integrity and ensure ethical use. Proper citation and attribution of ChatGPT's contributions are essential for recognising its role, preventing plagiarism, and adhering to the principles of scholarly writing. By following established citation guidelines, authors can fully benefit from ChatGPT while maintaining responsible and ethical usage.

Next, Desaire et al. (2023) presented a method for distinguishing text generated by ChatGPT from that written by academic scientists, utilising widely available supervised classification techniques. Their approach introduced novel features to differentiate human authors from AI-generated text. For instance, scientists tend to write longer paragraphs and exhibit a preference for equivocal language, frequently using conjunctions such as "but," "however," and "although." Using a set of 20 distinctive features, the researchers developed a model that classified the authorship of texts as either human or AI with an accuracy exceeding 99%. In addition, Malik et al. (2023) investigated students' perceptions of AI usage in academic essay writing through a case study design. The findings revealed a generally positive reception of AI writing tools, with students recognising the benefits in areas such as grammar checks, plagiarism detection, language translation, and generating essay outlines. AI was perceived as enhancing students' writing abilities, self-efficacy, and comprehension of academic integrity. However, some students voiced concerns regarding the potential negative impact on creativity, critical thinking, and ethical writing practices. Moreover, Song & Song (2023) evaluated the impact of AI-assisted language learning on the writing skills and motivation of Chinese students learning English as a Foreign Language (EFL). The quantitative analysis indicated significant improvements in both writing skills and motivation among students who received AI-assisted instruction, in comparison to the control group. The experimental group demonstrated enhanced proficiency in various aspects of writing, including organisation, coherence, grammar, and vocabulary. The qualitative findings reflected diverse perspectives, ranging from recognition of AI's innovative role in instruction and its positive effects on writing skills and motivation to concerns about contextual accuracy and over-reliance on AI. Participants also considered the long-term implications and sustainability of AI-assisted instruction, stressing the importance of ongoing development and adaptation of AI tools.

Following that, Khlaif et al. (2023) investigated both the potential benefits and concerns associated with the use of AI in scientific research. Their study focused on generating high-impact research articles through ChatGPT and assessing the quality of the generated reports in relation to the research framework, data analysis, and literature review. Additionally, the study explored issues surrounding ownership and the integrity of research involving AI-generated text. The results indicated that, when provided with detailed prompts and study context, ChatGPT could generate high-quality research articles that could potentially be published in high-impact journals. However, the impact of ChatGPT on the development of the research framework and data analysis was minimal. The literature review section, in particular, required substantial improvement. Moreover, reviewers raised concerns about ownership and the integrity of research when using AI-generated content. Despite these concerns, the study concluded that ChatGPT has significant potential to enhance human productivity in academic writing. The findings suggest that AI-generated text could improve the quality of high-impact research articles. On the contrary, Hwang et al. (2023) aimed to summarise how large language models can lower the barriers to academic writing in English, thereby allowing researchers to focus more on domain-specific research, provided that these tools are employed responsibly and with caution. Additionally, Guleria et al. (2023) discussed the role of AI and AI-assisted technologies, such as ChatGPT and other chatbots, in scientific writing and research, with particular attention to their contribution to bias, the spread of inaccurate information, and plagiarism. The results indicated that the information provided by ChatGPT was often inaccurate, with potentially far-reaching implications in fields such as medical science and engineering. The authors emphasised the importance of fostering critical thinking among researchers to raise awareness of the privacy and ethical risks associated with the use of AI in academic contexts.

Moreover, Conjin et al. (2023) sought to determine the impact of explanations provided by an automated essay scoring system on students' trust and motivation. The findings revealed that neither type of explanation had a significant effect on students' trust or motivation compared to when no explanation was provided. Interestingly, the grade assigned by the system, particularly the difference between the student's self-assessed grade and the system-assigned grade, had a notable influence on students' perceptions. Similarly, Taskiran & Goksel (2022) investigated whether automated feedback and teacher feedback contribute to academic writing achievement and if these feedback methods differ in their impact on the academic writing performance of students learning English as a foreign language in an open and distant learning environment. Statistical analysis of the grades revealed significant improvements in academic writing skills following regular feedback. Furthermore, it was found that writing scores improved slightly more when receiving feedback from teachers compared to automated feedback from the software. Finally, Utami et al. (2023) explored perceptions, obstacles,

and recommendations for optimising the use of AI in teaching academic writing in Indonesian. The findings indicated that: (1) AI-based learning tools assist students in conducting academic research, particularly during the planning phase by helping to identify and develop topics, as well as during the drafting phase by facilitating the development of a paper draft; (2) AI-based tools are perceived as flexible and accessible, though they do not fully meet all the students' writing needs; (3) students expressed interest in using AI technology in academic writing classes, as it makes the learning process more engaging. Despite the integration of AI in academic writing instruction, the tools have not consistently improved the quality of students' academic papers across all indicators. Several obstacles to AI usage were identified, including: (1) the need for more features, especially those related to editing Indonesian text; and (2) the suboptimal functioning of existing features.

In conclusion, the reviewed studies collectively underscore both the advantages and challenges of employing AI tools in academic writing. Nazari et al. (2021) demonstrated that AI-assisted writing tools significantly enhanced engagement, self-efficacy, and emotional responses among non-native English postgraduate students. Similarly, Song & Song (2023) reported notable improvements in writing skills and motivation for English as a Foreign Language learners supported by AI tools. Malik et al. (2023) also confirmed that students generally perceived AI positively, recognising its role in enhancing writing abilities, although concerns regarding creativity and critical thinking remained.

Conversely, Jarrah et al. (2023) and Guleria et al. (2023) both highlighted ethical issues, particularly in relation to plagiarism, accuracy, and bias in AI-generated content, calling for the responsible and ethical use of AI tools like ChatGPT. Desaire et al. (2023) developed a highly accurate method for distinguishing AI-generated text from human writing, while Khlaif et al. (2023) explored the potential for AI to generate high-quality research articles, raising concerns about ownership and the integrity of AI-generated content.

Moreover, Taskiran & Goksel (2022) and Conjin et al. (2023) examined the role of AI in feedback and automated scoring, finding moderate improvements in writing skills. However, their studies also revealed limitations regarding the influence of AI on trust, motivation, and overall writing quality. Utami et al. (2023) stressed the need for further development of AI tools to address specific writing needs, especially in non-English languages like Indonesian, while acknowledging the practical benefits of AI in academic research and writing instruction. In summary, these studies suggest that AI tools offer significant potential to enhance academic writing, particularly in areas such as language learning, feedback, and productivity. Nevertheless, issues related to ethics, accuracy, and the current limitations of AI tools must be carefully considered to ensure their responsible and effective integration into academic contexts.

5. Discussion

From the findings of research question 1, the three most highly cited articles from the review provide critical insights into the application of AI in academic writing, addressing distinct challenges and opportunities. Nazari et al. (2021), with 98 citations, is the most referenced study. Published in *Heliyon*, it explored the efficacy of AI writing assistants in higher education, focusing on non-native English-speaking postgraduate students. This randomised controlled trial examined the use of AI tools, such as Grammarly, and revealled that students experienced significant improvements in engagement, self-efficacy, and emotional well-being in their academic writing. The study's high citation count reflects its relevance to global academia, as it demonstrates how AI tools can support students in overcoming language barriers, a major challenge in international academic contexts. By providing formative feedback, these tools enhance learning outcomes and promote a positive attitude toward technology in education. Next, Jarrah et al. (2023), with 47 citations, addressed the ethical concerns related to using ChatGPT in academic writing, particularly its potential to facilitate plagiarism. This study, published in the *Online Journal of Communication and Media Technologies*, synthesises existing literature on ChatGPT's applications and its implications for academic integrity. It highlighted the ongoing debate surrounding responsible AI usage, stressing the importance of proper citation and transparency when AI tools are involved in writing processes. As AI becomes more prevalent in academia, the high citation count signals the urgency of addressing ethical issues, offering essential guidance on maintaining academic standards in an AI-influenced environment. Eventually, Desaire et al. (2023), published in *Cell Reports Physical Science* and cited 37 times, presented a method for distinguishing between human and AI academic writing. This study applied machine learning techniques to develop models that could classify text authorship with over 99% accuracy, identifying unique linguistic features of human writing, such as longer paragraphs and more nuanced use of conjunctions. Its impact laid in providing practical tools to safeguard academic integrity amid the increasing use of AI-generated text. The study's significant number of citations reflects the growing concern about maintaining the authenticity of academic work in the AI age, particularly for universities and publishers.

A notable trend emerging from these studies is the considerable number of highly cited articles published in 2023. This surge in citations likely reflects the rapid development of AI technologies, especially following the launch of ChatGPT in late 2022. With AI tools becoming more accessible, researchers are keen to explore their applications and implications in academic writing, resulting in an increase in research output. Furthermore, the pressing need to address ethical concerns, plagiarism risks, and the potential for AI-enhanced learning has driven the academic community to engage deeply with these topics. In addition, the diversity in past studies focussed and targeted populations across these studies further underscores their significance. For example, Nazari et al. (2021) concentrated on non-native English-speaking postgraduate students in higher education, addressing the global issue of language barriers in academia. In contrast, Jarrah et al. (2023) focused on the ethical dimensions of AI use, a concern with global relevance as educational

institutions confront the challenges of AI-assisted plagiarism. Desaire et al. (2023) tackled the integrity of academic writing, providing a technical solution to the increasing presence of AI-generated content in scientific research. These studies span different educational contexts and geographical locations, illustrating AI's broad applicability and the shared concerns about its integration into academia. Moreover, these studies originated from diverse countries and academic settings, reflecting the widespread interest in AI's role in education and research. The focus ranges from supporting non-native English speakers in Nazari et al. (2021) to addressing ethical issues in Jarrah et al. (2023), demonstrating the multidisciplinary and international relevance of AI in academic writing. As AI technologies continue to advance, these studies offer foundational frameworks for ensuring responsible and effective use of AI in academic contexts.

Therefore, the top three highly cited articles emphasise AI's growing influence on academic writing, providing essential insights into its pedagogical advantages, ethical challenges, and the maintenance of academic integrity. The rise in publications during 2023 highlights the increasing academic interest in understanding AI's impact on education and research, with scholars from diverse fields contributing to this vital discourse.

For research question II, the findings of the review underscore ChatGPT's dominance in academic writing research, establishing it as the most frequently used AI tool across various studies. Several factors account for its widespread adoption compared to other AI tools, such as Grammarly, Wizard-of-Oz, and Write and Improve. These factors include ChatGPT's multifunctionality, adaptability, and its capacity to generate human-like text, which has proven beneficial not only in academic writing but also in broader educational contexts. A key reason for ChatGPT's popularity is its versatility. Whereas tools like Grammarly and Wizard-of-Oz focus on specific functions, such as proofreading or grading, ChatGPT's language generation capabilities enable it to perform a wide range of tasks. It can assist with drafting, summarising, and expanding text, making it valuable in various stages of the writing process. For example, in studies such as Jarrah et al. (2023), ChatGPT was employed to explore its role in generating academic content and assessing its potential for misuse in plagiarism. Similarly, Song & Song (2023) and Hwang et al. (2023) used ChatGPT to support non-native English speakers, helping them to overcome language barriers in academic writing and research. This adaptability makes ChatGPT more appealing than more limited tools like Grammarly, which is primarily focused on grammar correction and proofreading.

Beyond academic writing, ChatGPT has gained recognition for its capacity to facilitate learning in diverse domains. Recent literature shows that ChatGPT is increasingly being used in classrooms as a tutoring aid, discussion facilitator, and content generator. Studies have indicated that ChatGPT can generate essay prompts, provide feedback on student essays, and create interactive learning experiences (Barrot, 2023). This flexibility allows educators to integrate ChatGPT into their teaching practices in more creative ways than other specialised AI tools like Wizard-of-Oz. Furthermore, ChatGPT has been explored as a learning companion across various subjects, from language arts to STEM fields, helping students practise problem-solving and critical thinking (Li et al., 2024).

However, despite its advantages, ChatGPT has notable limitations that must be critically considered. One of the most significant concerns, as highlighted by Jarrah et al. (2023), is its potential for facilitating plagiarism. ChatGPT's ability to generate coherent and well-structured text raises concerns about students submitting AI-generated work as their own. This has sparked ethical debates regarding authorship and academic integrity. Although tools like those developed by Desaire et al. (2023) can distinguish between human and AI-generated text with high accuracy, preventing academic dishonesty remains a pressing issue. Another limitation of ChatGPT is its tendency to produce incorrect or misleading information. Guleria et al. (2023) observed that ChatGPT's outputs can contain inaccuracies, particularly in fields like medical science, where precision is essential. These inaccuracies arise from ChatGPT's training on vast datasets that may include both accurate and erroneous information. Therefore, while ChatGPT is useful as a content generator, it is crucial for users to exercise caution and verify its outputs, particularly in areas where factual accuracy is critical.

Moreover, the over-reliance on ChatGPT may hinder the development of critical thinking and creativity among students. Studies such as Malik et al. (2023) reveal mixed perceptions among students regarding AI writing tools, with some expressing concerns that these tools might discourage them from fully engaging in the learning process. While ChatGPT can improve writing fluency and grammar, it is vital to ensure that students continue to cultivate independent thinking and creative writing skills.

In short, ChatGPT's popularity in academic writing and education can be attributed to its multifunctionality and adaptability, allowing it to support a variety of academic tasks. It is not only used for writing assistance but also for broader educational purposes such as tutoring and content generation. Nevertheless, concerns about plagiarism, inaccuracies, and over-reliance on the tool must be critically addressed. As ChatGPT continues to evolve and be integrated into educational settings, these challenges must be tackled to ensure its responsible and effective use.

Subsequently, the findings of the research question III highlight both the transformative potential and the challenges associated with using AI tools in academic writing. While many positive outcomes are reported, considerable concerns remain. The benefits of AI, as demonstrated in studies such as Nazari et al. (2021) and Song & Song (2023), are consistent with contemporary research, which shows how AI tools like ChatGPT and Grammarly can support non-native English speakers and enhance students' overall engagement and self-efficacy in academic writing. For instance, Alharbi (2023) similarly found that AI tools significantly improved the writing proficiency of ESL students by enhancing their grammatical accuracy and coherence. This consistency across studies underscores the value of AI in language learning, particularly in academic contexts where language barriers can impede student performance.

In Nazari et al. (2021), the use of Grammarly was shown to improve cognitive, emotional, and behavioural engagement, a finding supported by Guo & Li (2024), who reported that AI-driven writing assistants enhanced students' writing confidence and motivation. The statistical improvements in writing efficacy observed in Song & Song (2023) further confirm that AI tools play a crucial role in education, particularly for English as a Foreign Language (EFL) students. These tools provide EFL learners with immediate feedback on grammar and coherence, support that may not always be available in traditional classroom settings, allowing them to gain confidence in their writing.

However, the ethical concerns surrounding AI use, as raised by Jarrah et al. (2023) and Guleria et al. (2023), highlight significant challenges that need to be addressed to ensure the responsible integration of AI tools in academia. These studies pointed to issues of plagiarism, bias, and inaccuracies in AI-generated content, concerns echoed by Grassini (2023), who argue that AI tools like ChatGPT can easily be misused, leading to academic dishonesty. The potential for ChatGPT to facilitate plagiarism suggests that while the tool can enhance writing productivity, it also risks undermining academic integrity. This aligns with Zhai et al. (2024), who caution that AI-generated content can allow students to bypass essential learning processes, leading to over-reliance on AI and a decrease in critical thinking and creativity.

In contrast, some studies argue that the ethical concerns surrounding AI can be mitigated through responsible usage, particularly with clear guidelines and policies. For example, Dabis & Csáki (2024) propose that institutions adopt strict AI-use policies that include transparent citation practices when AI tools are employed in academic writing. This approach is in line with Desaire et al. (2023), who introduced a method to distinguish between human- and AI-generated text accurately, demonstrating that while the use of AI in academic writing poses risks, these risks can be managed with the appropriate tools and frameworks. The mixed perceptions of AI tools reported by Malik et al. (2023) reflect broader discussions on the potential over-reliance on AI for academic tasks. While many students recognized AI's utility in improving grammar and essay structure, concerns about its potential to limit creativity and critical thinking were raised. This finding is supported by Marzuki et al. (2023), who noted that students who frequently relied on AI writing tools showed less improvement in analytical skills compared to their peers who used more traditional writing methods. These concerns suggest that while AI tools offer significant advantages in automating writing tasks, educators need to find a balance to ensure students continue to develop essential cognitive and analytical skills.

The studies of Taskiran & Goksel (2022) and Conjin et al. (2023), which examined AI's role in providing feedback and automated grading, align with research showing moderate improvements in students' writing abilities. However, their findings on trust and motivation are mirrored by Garofalo & Farenga (2024), who found that students were sometimes skeptical of AI-generated feedback, particularly when it contradicted their self-assessments. This suggests that while AI tools can provide valuable insights, their influence on students' trust and engagement is limited when compared to human feedback. In conclusion, while AI tools like ChatGPT and Grammarly offer significant potential to enhance academic writing, particularly for non-native speakers, they also present challenges that must be critically addressed. Ethical concerns, accuracy issues, and over-reliance on AI tools raise questions about their integration into academic settings. The mixed results across studies reflect the complexity of fully integrating AI into academic practices. To harness AI's full potential, it is necessary to adopt a balanced approach that emphasizes responsible use, the establishment of clear educational policies, and the continued development of students' critical thinking and analytical skills as key components of AI-assisted writing.

This review of 11 highly cited studies on the use of AI in academic writing offers valuable insights into both the benefits and challenges of integrating AI tools into educational practices. The findings from these studies address practical, ethical, and methodological concerns, while also suggesting future directions for research in the field. First and foremost, the reviewed studies provide compelling evidence that AI tools can significantly enhance students' academic writing experiences. Nazari et al. (2021) demonstrated that AI-powered writing assistants improved non-native English postgraduate students' engagement, self-efficacy, and emotional well-being. Similarly, Song & Song (2023) reported significant improvements in writing skills and motivation for English as a Foreign Language (EFL) students using AI tools. On the other hand, Jarrah et al. (2023) and Guleria et al. (2023) raised ethical concerns about plagiarism and the accuracy of AI-generated content. In addition, Desaire et al. (2023) proposed a method for distinguishing between human and AI-generated text with over 99% accuracy. Eventually, Malik et al. (2023) noted students' generally positive perceptions of AI tools, although concerns about creativity and critical thinking persisted. Next, the findings present both theoretical and practical implications for understanding AI's role in academic writing. Theoretically, the review underscores AI's growing influence in educational theory, particularly how it can scaffold learning by offering real-time feedback and automating routine writing tasks. AI tools, such as those examined in Nazari et al. (2021) and Song & Song (2023), help students improve grammar and citation formatting, freeing them to focus on higher-order thinking skills. However, the review also highlights the need for further theoretical exploration to balance AI tool use with the development of independent critical thinking skills. Practically, the review emphasises AI's transformative potential in academic writing by providing real-time assistance and improving student engagement. However, scholars such as Jarrah et al. (2023) and Khlaif et al. (2023) caution against over-reliance on AI, urging educators to implement it responsibly. This is particularly important in maintaining AI as a supportive tool rather than a substitute for active learning. Moreover, the methodology proposed by Desaire et al. (2023) for distinguishing between AI- and human-generated text is crucial for upholding academic integrity. The review signals the importance of developing clear strategies and guidelines for the ethical use of AI tools in education.

6. Conclusion

In conclusion, the review identifies key areas for further research, particularly in refining ethical frameworks for AI use in academic writing. For students, AI tools provide opportunities to improve their writing skills and confidence, particularly for non-native speakers who face additional challenges. For educators, AI tools offer the potential for more personalised feedback and efficient grading, while supporting students in overcoming common writing challenges. However, the review serves as a reminder that AI should complement rather than replace traditional teaching methods, which are essential for fostering creativity and critical thinking. The limitations of this literature review primarily stem from its methodology. First, the selection of studies was limited to highly cited articles, which may exclude emerging research that offers innovative insights but has not yet gained significant attention. This reliance on citation counts could result in a skewed understanding of the field by focusing only on well-established findings. Additionally, the review predominantly considered open-access articles, which might limit the scope of the research included and exclude key studies from subscription-based journals. Another limitation lies in the keyword search methodology, which may have excluded relevant interdisciplinary studies that address AI's role in broader educational contexts but are still pertinent to academic writing. To ensure the responsible use of AI in academic writing, future research should focus on developing frameworks that encourage AI tools to support, rather than replace, critical thinking and creativity. Additionally, there is a need to refine AI tools for greater accuracy and better contextual understanding, particularly for complex academic tasks such as literature reviews and scientific analyses. Researchers should also explore how AI can better support non-native English speakers, ensuring that tools are adaptable to diverse educational needs. Lastly, educational institutions must establish clear guidelines for the ethical use of AI, educating both students and educators on the limitations and responsibilities associated with AI technology. While AI tools offer tremendous potential to enhance academic writing and improve learning outcomes, their integration into education must be carefully managed to maintain academic integrity and foster student development. The future of AI in academic writing lies in balancing AI's capabilities with the need for students to retain and develop essential critical thinking and writing skills. Effective policies, combined with responsible use, will ensure that AI continues to support learning without undermining the educational process.

Acknowledgement

The authors would like to thank fellow authors and organizations whose intellectual property was utilized for this study.

Conflict of Interest

The authors declare no conflicts of interest.

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