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The Impact of Artificial Intelligence Tools on Academic Writing Instruction in Higher Education: A Systematic Review

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Abstract
With the growth of Artificial Intelligence technologies, there is interest in studying their potential impact on university academic writing courses. This study examined whether AI tools are replacing these courses by exploring how they effectively replace traditional academic writing instruction and this shift's potential benefits and drawbacks. The researcher reviewed existing literature on integrating AI tools into academic writing instruction. The findings provide insights to educators navigating the integration of Artificial Intelligence tools into writing curricula while maintaining instructional quality and academic integrity standards. By synthesizing the latest research, this study can inform decisions about the appropriate use of Artificial Intelligence in teaching essential writing skills. Increased use of Artificial Intelligence writing tools has sparked debate about their role in academic writing instruction. Universities like Stanford have updated policies around Artificial Intelligence tool usage and academic integrity. The University of California issued guidance acknowledging the prevalence of generative Artificial Intelligence on campuses. Middlebury College banned classroom use of ChatGPT over concerns it could impede critical thinking and writing skill development. Results show that while Artificial Intelligence helps with grammar and style, questions remain about its impact on creativity and critical thinking. However, Artificial Intelligence is not replacing university writing courses. These courses teach critical thinking, research, citation, argumentation, creativity, originality, and ethics, which Artificial Intelligence lacks. Academic writing courses offer a complete learning experience. Artificial Intelligence may improve academic writing but is unlikely to replace traditional courses soon. A balanced approach integrating Artificial Intelligence support while preserving core elements of academic writing education appears most effective for preparing students for diverse writing challenges.
Keywords: Artificial Intelligence in higher education; Artificial Intelligence in academic writing; Writing courses; Artificial Intelligence in academia; ethical issues of Artificial Intelligence in academic writing.

Introduction

Academic writing courses have been designed over centuries to equip students with the skills and knowledge necessary to excel in various educational programs. Researchers have specifically designed these educational programs to assist learners in cultivating and improving their writing proficiency in core concepts (Teng & Wang, 2023). These academic writing concepts include structuring and organizing academic papers, ensuring proper referencing and citation of borrowed scholarly ideas, and writing inappropriate language and style (Cheong et al., 2023; Mendoza et al., 2022; Schillings et al., 2023). Academic writing courses further emphasize aspects such as critical analysis and thinking, practical research skills and integration of ideas, and academic integrity, including original and non-plagiarized assignments (Teng & Wang, 2023).

Academic courses are commonly available in institutions like universities, colleges, or online platforms. According to Livberber and Ayvaz (2023), the classes cater to students, researchers, scholars, and professionals seeking to enhance their proficiency in academic communication. The main objective of academic writing courses is to instruct participants on the established norms, techniques, and criteria for writing that are widely acknowledged in academic and scholarly environments (Ginting & Barella, 2022; Teng et al., 2022; Wilby, 2022). While academic courses help advance knowledge in various fields, scholars observe that both students and novice writers face challenges when writing academically (Cheong et al., 2023). In efforts to address these hurdles, there is an increasing trend in utilizing writing technologies to explore new opportunities for academic writing support.

Artificial Intelligence (AI) powered writing aides are among the developing technologies in academic courses. AI-driven writing tools commonly employ Natural Language Processing (NLP) trained on extensive collections of text created by humans (Ginting & Barella, 2022; Nazari et al., 2021; Perkins, 2023). A growing body of scholarly evidence is in consensus that AI-driven assistants have demonstrated promise in enhancing students' writing abilities and boosting their confidence and productivity during the writing process. However, there are apprehensions regarding their ability to foster reliance or to be utilized unsuitably (Machicao, 2019). For example, AI technologies such as ChatGPT can generate unique and logical content that can evade detection by current technologies and well-trained academic personnel (Perkins, 2023), giving rise to significant problems over academic integrity.

AI programs such as QuillBot, AI Writer, and Typeset offer the ability to rephrase original phrases or sentences by modifying the sentence structure or substituting words with synonyms. Wordtune offers a translation option that assists individuals who are not native English speakers in translating several languages into English (Nazari et al., 2021). ChatGPT, Trinka AI, and Writesonic facilitate the generation of text-based material, making writing more accessible for students and saving time (Bhatia, 2023; Cheong et al., 2023). Additionally, studies indicate that AI tools such as Grammarly, Jasper, and Consensus not only assist users in improving their writing (Teng & Wang, 2023; Zhao et al., 2023) but may also offer possibilities for academic proficiency when users observe discrepancies between their initial writing and the more proficient revision suggested by the program.

Despite the growing importance of AI in academia, theoretical frameworks to explain their dynamics and use in academic writing courses are lacking. The literature discusses standard theoretical models, including the technology acceptance model developed by Davis et al. (1989), the Constructivist Learning Theory rooted in the work of Piaget and Vygotsky (Rohde et al., 2023), and the Community of Inquiry (CoI) Framework proposed by Garrison et al. (1999). TAM

postulates that factors such as perceived usefulness and ease of use may influence the successful integration of AI in academic courses (Chocarro et al., 2023; Davis et al., 1989; Zhai & Ma, 2022). Constructivist theories emphasize active learning and knowledge to facilitate student engagement, collaboration, and the co-construction of knowledge (Rohde et al., 2023). CoI asserts that AI tools contribute to building a sense of community, fostering cognitive engagement, and supporting effective teaching in the online component of academic writing courses (Wang et al., 2022).

Nevertheless, like other AI-driven digital instruments, AI tools possess constraints, such as sporadic error notifications inaccuracy in rephrasing, and have raised apprehensions over excessive dependence on digital tools and their influence on academic integrity (Teng et al., 2022; Zhao et al., 2023). While AI tools, such as plagiarism detectors like Turnitin and grammar checkers like Grammarly, are becoming more prevalent, it is unclear whether AI tools can replace creativity in academic courses. There is contention regarding the impact of AI on students' critical thinking, research processes, and communication skills that are beyond the current scope of automated tools. Schillings et al. (2023) cautioned that academic writing is not limited to syntax and grammar like the current AI operations; rather, the process entails complex aspects like analysis, argumentation, and material synthesis, which are skills that AI tools cannot replicate fully. To this end, the current systematic literature review explores the emerging contentious issue regarding whether *artificial intelligence tools are replacing academic writing courses at universities*.

The significance of this study lies in the need to critically examine the role of AI in an essential component of university curricula - developing students' abilities in academic writing and composition. Strong writing skills are foundational for communicating ideas effectively, conducting research, critically analyzing texts, and succeeding in many educational and professional domains (Conijn et al., 2023; Zhai & Ma, 2022). However, the rise of AI writing assistants raises concerns about an overreliance on technologies that may impede the fostering of these crucial skills. There is a need to investigate to what extent AI tools can constructively support versus potentially undermining or detract from the learning objectives and pedagogical approaches of human-led academic writing instruction (Teng et al., 2022). While AI grammar checkers and language models may help with editing and originality, it remains unclear if they can adequately teach higher-order skills like rhetorical analysis, synthesizing sources, formulating evidence-based arguments, adhering to disciplinary writing conventions, and developing an authentic voice.

Moreover, there are open questions about AI's impact on upholding academic integrity standards, instilling critical thinking mindsets, and facilitating the iterative writing process under an instructor's guidance (Perkins, 2023). The findings of this review could shed light on the appropriate integration of AI while maintaining the quality and rigor expected of university-level writing education. The motivation behind conducting the review was that by synthesizing the latest research on this topic, the systematic review aims to provide insights to educators, administrators, and educational technologists to make informed decisions about AI's role in teaching academic writing. Obtained findings could shape future curriculum development, instructional practices, writing program policies, and the productive use of AI tools alongside human instruction. With many universities already using or considering AI writing aids, there is a timely need to understand AI's implications for this core area of higher learning. This study anchors its primary research questions as follows:

RQ1: To what extent can artificial intelligence tools effectively replace traditional academic writing courses in universities, and what are the potential benefits and drawbacks associated with this shift?

RQ2: How do teachers and students perceive the use of artificial intelligence tools for academic writing compared to traditional writing courses, and what impact does this have on their writing skills, critical thinking, and overall academic performance?

RQ3: What are the pedagogical implications of integrating artificial intelligence tools into academic writing instruction, and how can educators effectively design and implement AI-assisted writing modules to enhance student learning and engagement?

RQ4: What are the ethical implications of using AI writing tools in universities, and how can these be addressed or mitigated?

The researcher organizes the subsequent sections of this systematic literature review as follows: elaborating the main theoretical and empirical foundations of AI use in academic writing courses through the literature review; delineating the study's design in the methodology section by elucidating the research framework, data sources, search criteria, inclusion and exclusion process, and data analysis; presenting and discussing the results of the data analysis, highlighting their significance and implications in academic writing courses; discussing key findings based on past literature and theoretical frameworks; and lastly, briefly outlining a summary of this inquiry's primary purpose and research questions in the conclusion section.**Literature Review**

Since the inception of AI writing tools in 2007 (Zhai & Ma, 2022), scholars and practitioners have attempted to formulate a theoretical framework to understand their impact on academic writing courses. StatSheet was the first automated online sports writing tool introduced in 2007 in North Carolina. Then, in 2009, the Grammarly writing assistant was introduced, followed by other tools like WordSmith and Narrative Science's Quill (Wu et al., 2022). With the growing development and uptake of several AI tools today, scholars observe that examining the use of AI in academic writing courses involves drawing upon various theoretical perspectives to analyze its impact, effectiveness, and implications (Teng et al., 2022; Wilby, 2022). Some relevant theories for examining the integration of AI tools in academic writing courses include TAM, constructivist learning theory, and CoI.

TAM focuses on users' perceptions and attitudes towards technology adoption. Scholars hold that if students find AI tools easy to use and valuable in their academic tasks, they are more likely to integrate them into their educational programs (Algerafi et al., 2023; Almaiah et al., 2022; Kim & Kim, 2022). Scholars also explain that subjective norms are due to perceived social pressure from friends and peers to inform students of the use of AI in their research process (Ali, 2020; Chocarro et al., 2023; Davis et al., 1989; Zhai & Ma, 2022). The UTAUT (Unified Theory of Acceptance and Use of Technology) also helps explain several constructs for AI use in academic writing (Lin et al., 2022). Some of the reasons for AI uptake in academia could be due to performance expectancy (students believe using AI eases their writing process), effort expectancy (easy to use AI tools and tailor them to personal needs), social influence (perception that peers or teachers are also using AI tools), and facilitating conditions (i.e., existence of technical and organizational infrastructure to support AI utilization) (An et al., 2023; Lin et al., 2022; Wongras & Tanantong, 2023; Wu et al., 2022).

Communities of inquiry have also influenced AI use in academic courses. For example, AI use in academic writing courses could also be due to an individual's desire to engage, collaborate, and co-construct knowledge. The approach aligns with the Constructivist Learning Theory based on the concept of Piaget and Vygotsky, which emphasizes active learning and knowledge

construction in tools like Google Translate, Consensus, and Google Scholar (Salvagno et al., 2023). The CoI framework further aids in understanding how AI integrates into writing courses based on its influence on social, cognitive, and teaching presence in online learning environments. AI tools foster cognitive engagement, build a sense of community, and support effective teaching and learning in the online component of academic writing courses (Kaczkó & Ostendorf, 2023).

Additional theories explored in AI integration in academic courses include cognitive load theory, activity theory, critical pedagogy, and ecological systems theory. Cognitive load theory, developed by Sweller (1988), examines the mental effort required for learning, helping understand whether AI enhances or hinders students' learning experience (Berssanette & de Francisco, 2022). Activity Theory, developed by Vygotsky and expanded by Leont'ev, focuses on individual interactions and their social and cultural context (Li, 2023). Researchers have applied activity theory to understand the impact of AI tools on academic writing activities, shaping the roles of students, instructors, and tools within the writing process (Berssanette & de Francisco, 2022). Critical Pedagogy is rooted in the works of Paulo Freire and focuses on questioning and challenging established norms (Pronzato & Markham, 2023). Critical pedagogy is essential in examining the socio-political implications of relying on AI tools, including access, power dynamics, and bias. Ecological Systems Theory, developed by Urie Bronfenbrenner, has been applied to examine how the introduction of AI tools influences the writing ecosystem, including interactions with peers, instructors, and the broader educational context (Sajjad et al., 2023). These theories provide lenses through which researchers and educators can analyze and understand the multifaceted impact of integrating AI tools into academic writing courses.

A review of recent scholarly literature by Hemachandran et al. (2022) discovered that tools, including Grammarly, Jasper, and QuillBot, "can augment tutoring in higher education by achieving a maximum accuracy of 58% in student assessment data" (p. 6). AI-based Grammarly instruction improved EFL essay writing skills for Egyptian senior students compared to traditional methods. Marghany (2023) reported that AI-based Grammarly instruction improved EFL essay writing skills for Egyptian senior students compared to conventional methods. Widiati et al. (2023) found that AI writing tools positively improved students' writing quality, particularly in "content and organization, as perceived by English as a Foreign Language (EFL) teachers" (p. 349). These studies suggest that AI tools, including Grammarly, QuillBot, Sudowrite, Chibi, and ChatGPT, can improve students' academic writing and engagement in higher education. However, their impact on all quality indicators of academic papers may not be positive, and their use can raise concerns about academic integrity.

Some researchers have identified potential gaps for further exploration. Caprioglio and Paglia (2023) raised concerns that there is a lack of research on the impact of AI writing tools on higher-order skills like critical thinking, analysis, argumentation, and synthesis in academic papers across different disciplines. Alharbi (2023) also noted that there is limited research related to how the "use of AI tools influences the development of an authentic student voice and writing style in academic contexts" (p. 8). Malik et al. (2023) raised concerns about the increased uptake of AI tools despite a lack of insights on whether such writing assistant tools could effectively teach and assess adherence to disciplinary writing conventions, citation styles, and academic integrity standards. DuBose and Marshall (2023) recommended the need by future researchers to comprehensively evaluate the benefits and limitations of AI writing tools in facilitating the overall writing process, from research and ideation to drafting, revising, and finalizing academic papers.

Based on the literature discussed, it is possible to identify a potential research gap: the lack of comprehensive studies evaluating the impact of AI writing tools across all academic writing skills and quality indicators in higher education contexts. However, there remains a lack of thorough understanding regarding the nuanced effects of these tools on different quality indicators of academic papers (Caprioglio & Paglia, 2023; Marghany, 2023; Salvagno et al., 2023; Scott et al., 2020). While some studies suggest positive impacts on writing quality and engagement, others raise concerns about their effectiveness across all areas and potential implications for academic integrity. Additionally, limited research addresses the efficacy of AI-based writing tools in diverse educational contexts and student populations. Furthermore, more rigorous studies are needed to examine the long-term effects and sustainability of integrating AI tools in academic writing instruction at the university level.

Academic Writing Courses

Scholarly literature holds that academic writing courses are essential for students in tertiary educational institutions, as they help students present their research projects at international conferences and publish in foreign scientific journals (Teng & Wang, 2023). However, traditional approaches to academic writing often exclude the voices and experiences of marginalized groups, such as Black, Indigenous, and People of Color (BIPOC) (Alston et al., 2022). To address this, pedagogical approaches are being designed to focus on helping emerging BIPOC scholars find and cultivate their academic writing identities, fostering a sense of agency (Hussain & English, 2023). Students prefer blended peer review methods in academic writing courses due to their ability to address different learning needs, making peer review essential (Wilby, 2022). Overall, there is an emphasis on ensuring that academic writing courses are inclusive, supportive, and tailored to the specific needs of students from diverse backgrounds.

Various challenges mar academic writing courses in universities despite their importance. A significant difficulty is the need for writers to plan and think before commencing the research process (Ali, 2020; Teng & Wang, 2023) since writing entails more than transferring oral thoughts into written form (Hemachandran et al., 2022; Mendoza et al., 2022). There is also a lack of specific training for graduate students, resulting in hindrances to effective scholarly writing (Cheong et al., 2023). Multiple revisions and rewrites also complicate the writing process since many students lack sufficient writing skills (Schillings et al., 2023). Scholars also observe that non-native English speakers experience challenges writing academic assignments due to inadequate skills in developing ideas (Teng & Wang, 2023), using correct grammar (Livberber & Ayvaz, 2023), sourcing for references (Teng et al., 2022), and comprehending feedback (Alston et al., 2022; Wilby, 2022). High expectations from teachers, time constraints, and low information literacy further contribute to negative experiences by students during academic writing courses (Cheong et al., 2023). These challenges may highlight the growing shift to integrating AI tools into academic writing among students to enhance their writing skills.

Artificial Intelligence and Academic Writing Courses

In academic writing instruction at the university level, AI entails using computer systems and technologies to perform tasks typically associated with human Intelligence and cognitive abilities (Leoste et al., 2021; Kamalov et al., 2023). Specifically for academic writing courses, AI can encompass tools, software, and language models designed to assist students and instructors with various aspects of the writing process (Akgun & Greenhow, 2022; Fyfe, 2023; Gardner et al.,

2021). Considering the challenges students experience, AI has emerged as central to enhancing academic writing courses. For example, Wordtune, Grammarly, and Google Translate are popular AI-powered writing tools (Dong, 2023; DuBose & Marshall, 2023). These tools help students paraphrase, improve grammar, overcome cognitive difficulties, and improve their writing. AI technologies like ChatGPT, RapidMiner, Copilot, and Iris.ai help with data analysis, literature reviews, and paper writing (Chen et al., 2020a; Malik et al., 2023). These technologies can automate various writing tasks, improving efficiency and workflow. However, educators and researchers must carefully consider the ethical implications of using AI-driven writing aids and create clear rules for their use (Alharbi, 2023; Caprioglio & Paglia, 2023). These technologies can improve students' writing and research by being integrated into academic writing courses.

Research has demonstrated that learning tools powered by AI can aid students at several phases of the writing process, including planning and drafting, resulting in enhanced writing abilities (Gayed et al.,2022; Utami et al., 2023). Salvagno et al. (2023) established the beneficial influence of AI on students' writing aptitude and belief in their abilities. These technologies have demonstrated their worth as valuable resources for learners, particularly by offering prompt feedback and enhancing writing proficiency. Thus, researchers have discovered that AI-driven writing tools favorably impact students' writing skills by delivering prompt and personalized feedback, fostering active participation, and enhancing grading efficiency.

However, implementing AI in academic writing courses has sparked concerns over its influence on students' critical and creative thinking abilities. Nevertheless, proponents contend that AI tools can offer advantages and facilitate rigorous research prospects (Ali et al., 2023; Perkins, 2023). AI can streamline the cyclical self-assessment process in academic writing sessions, with the degree of involvement varying based on students' motivation and confidence in AI (Machicao, 2019). Makarius et al. (2020) emphasized the necessity for inquiries into the responsibilities of educators and emerging ethical issues. Su et al. (2022) found that AI technologies can help provide feedback in their study. The researchers did, however, stress the continued importance of teacher supervision in fostering critical thinking and creativity. In terms of ethics, Chaudhry et al. (2023) looked into how AI affected plagiarism detection, highlighting the need for clear standards and teaching students about the proper use and limitations of AI.

Artificial Intelligence in academic writing also raises ethical issues. AI-generated content is elusive and may breach intellectual property rights, making plagiarism detection difficult. There are also concerns that AI technology may hinder critical thinking and originality in doctoral dissertation writing (Alston et al., 2022; Nazari et al., 2021). Standards and rules that ensure ethical AI use in academic writing are needed to address these challenges. Perkins (2023) advocates improving transparency and comprehension in AI-generated literature to address its interpretability. In light of the study findings, the literature review on AI in the context of writing academic courses reveals its significant and transformative impact in academia. While AI-powered writing tools significantly assist instructors and students, ethical usage, preconceptions, and context comprehension issues require ongoing research and development. Through a well-balanced and cohesive integration of AI-powered automation with human guidance, educators and students can successfully leverage the full capabilities of AI to improve learning outcomes.

Higher Education Perceptions of AI Tools

Higher education is starting to recognize the growing relevance of AI-driven writing tools, which provide many features to assist writers and students in writing. The usefulness of AI writing

tools in higher education has been the subject of numerous research (Roe et al., 2023). Grammarly is an AI program that assesses grammar and style. Huang et al. (2020), Dizon and Gayed (2021), and Thi and Nikolov (2022) investigated how Grammarly influences undergraduate students' academic writing. These studies agreed that Grammarly users improved their writing and grammar more than the control group. Researchers have studied AI language models like ChatGPT to help students create content (Bhatia, 2023; Roe et al., 2023; Yasin & Al-Hamad, 2023; Zhao, 2023).

In a study by Imran and Almusharraf (2023) and Ali et al. (2023), ChatGPT was used to help graduate students develop research ideas. The results showed that although AI-generated content helped provide initial ideas and structure the proposals, students still needed to improve and expand on the material they had produced. In their study, Yan (2023) and Lingard (2023) used a survey to assess students' perceptions of AI tools and their understanding of how to use AI-generated data appropriately. The results emphasized the importance of giving enough guidance and teaching about AI tools to deter plagiarism and maintain academic integrity.

Research has also examined automated essay assessment tools with AI for feedback and grading. Mizumoto and Eguchi (2023) evaluated the two approaches to assess the effectiveness of AI and human grading on student writing. The reliability of AI grading as a formative assessment is evident from the high correlation between grades and human grades. The increasing demand for AI-driven writing systems and their potential impact on student's academic progress, efficiency, and writing talents remains essential for dissertation writing in higher education. Integrating AI responsibly and effectively in higher education requires addressing ethical concerns, providing proper teaching, and refining AI-generated content. AI technologies in higher education have clear benefits, but these concerns are essential. There is a need to improve AI writing tools and find new opportunities to strengthen writing in higher education.

Method

An application of desktop research design identified relevant studies on AI use in academic writing courses. Wahid et al. (2023) observed that desktop research entails collecting secondary data from publicly available documents. Unlike primary data from surveys and interviews, secondary data is cheap, easily accessible, and saves time when reviewing prevalent trends in a topic of interest (Wahid et al., 2023). The rationale for using secondary or desktop research design was informed by growing studies using publicly available data to explore the impact of AI on institutions of higher learning (Bearman et al., 2023; Kuleto et al., 2021; Ouyang et al., 2022). Insights from peer-reviewed studies, therefore, will help capture recent and emerging trends on the topic in a cost- and time-effective manner.

Sources of Data

Using various sources of information ensured a thorough and meticulous analysis of AI's impact on academic writing courses. Academic databases were the primary sources of data used to identify peer-reviewed journals. The academic databases important for this study include IEEE, Research Gate, Science Direct, Google Scholar, and Semantic Scholar. CiteSeerX, Wiley Online, Springer, Emerald, and Wiley Online are more academic databases featured.

Search Criteria

The researcher compiled various terms, keywords, or search terms to identify appropriate resources about AI's impact on academic writing courses. When used independently or with other phrases, these keywords facilitated a thorough and all-encompassing search procedure. Some of

the keywords used included "AI use in academia," "AI tools and student writing," "ChatGPT and academic writing," "Grammarly impact on education," "QuillBot use in rewriting," and "Geographical information systems." Additional keywords included "Strategic niche artificial intelligence in higher education," "student and teacher perception of AI technology," "ethical issues of AI in academic writing," "impact of AI on student creativity and writing," "writing bots and academic writing," "AI tools replacing academic writing," and "AI supplementing academic courses."

Inclusion and Exclusion Criteria

Predetermined inclusion criteria were essential in identifying relevant studies. Table 1 summarizes the inclusion and exclusion criteria, focusing on topic, publication, years, language, and sector. The researcher considered only studies examining the use of AI tools in academic writing courses. Primary studies primarily include peer-reviewed journals published in the last four years (January 2020 and January 2024). The researcher included articles published in the past five years. However, the researcher excluded books, magazines, periodicals, internet sources, and blogs from the study. The included articles focused on EFL learners and instructors in Saudi Arabian universities.

Table 1. *Inclusion and exclusion criteria for article selection*

Criterion	Inclusion	Exclusion
Topic	Explores AI use in academic writing courses in higher education institutions	Examines AI use in non-academic institutions
Publication	Academic journals and peer-reviewed publications	Website articles, books, periodicals, reports, surveys, opinion articles
Years	Researched between January 2020 and January 2024	Articles published before 2020
Language	English language publications only	Non-English language studies
Sector	Colleges, universities, and other higher learning institutions	Commercial companies, businesses, and other non-academic sectors

Research Instruments

PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) provided guidelines on using a structured study selection process as the primary research instrument for a systematic literature review. At the same time, CASP (Critical Appraisal Skills Programme) offered checklists to evaluate the quality and risk of bias in different study designs. According to Zhao et al. (2022), PRISMA recommends various steps as the research instrument for study selection. The steps used in this study included (1) a database search strategy focusing on clearly reporting all databases searched, search dates, and the complete search strings/keywords used. (2) Study eligibility criteria aimed at defining inclusion and exclusion criteria based on parameters like population, comparator, outcomes, and study designs. (3) The study selection process focused on describing screening studies at title/abstract and full-text levels using at least two independent reviewers, with a process to resolve disagreements. (4) Data extraction involves using a standardized form to extract relevant data from included studies, such as study details, participant characteristics, interventions, outcomes, and results.

CASP provided critical appraisal checklists for various study designs to assess methodological quality and risk of bias. This study utilized some relevant CASP checklists to evaluate whether the identified studies addressed a focused issue, whether the authors used an appropriate method to answer their questions, and whether the cases/participants were recruited acceptably (Cumpston et al., 2022). Quality assessment of the studies also involved evaluating if the variables were measured accurately to minimize bias and if the authors accounted for potential confounding factors. Cumpston et al. (2022) further stressed the need to determine the clarity of the findings, applicability to research, and if the applied can be applied to the population of research interest and generalized to other settings. Combining the PRISMA research

instrument for comprehensive study selection and the CASP quality assessment checklists enabled the researcher to ensure a rigorous and transparent process for identifying, evaluating, and synthesizing relevant evidence from the existing literature.

Data Analysis

Document analysis assessed the 43 studies identified during the search process. Morais et al. (2021) revealed that document analysis relies on qualitative appraisal and interpretation of primary funding to provide voice and meaning to the phenomenon under research. Document analysis involves assigning themes, categorizing data into related meanings, and making inferences about study patterns consistent with the goals and research. First, the researcher developed a coding scheme or framework to outline the themes and categories being explored based on the research questions.

The categories were broad to capture diverse information and specific enough to be meaningful. These categories included (1) *AI and traditional academic writing courses*, (2) *teacher and student perceptions*, (3) *pedagogical implications*, and (4) *ethical implications*. Second, familiarizing the 24 documents was undertaken by perusing abstracts, introductions, literature, methods, and findings to understand their content. Second, the researcher summed up notes of key concepts and recurring ideas in an Excel document. Third, the following section is related to assigning preliminary codes to segments of the texts that align with the four themes.

Fourth, the researcher conducted iterative coding, which involved reviewing the documents multiple times, refining, and expanding the initial codes. This phase focused on looking for patterns, relationships, and variations within the data. Fifth, condensed and summarized the coded data to identify overarching themes through data reduction. At this step, remove any redundancy and irrelevant information. Sixth, the researcher identified and grouped major and minor themes into broader categories to form themes based on the coded data and analyzed the themes concerning the research questions. Lastly, the researcher presented the findings through report writing in a clear and organized manner. The following section details the conclusions obtained.

Research Procedures

An exhaustive literature search was conducted across multiple electronic databases, including Web of Science, Scopus, ERIC, and Google Scholar, to identify relevant studies. The search used a combination of keywords and Boolean operators related to the topic, such as "artificial intelligence," "AI tools," "academic writing," "writing instruction," "higher education," and their variations. The initial database search yielded a total of 357 potentially relevant studies. After removing 71 duplicate records, 286 unique studies remained. These studies underwent a two-stage screening process as follows:

In Stage 1, the titles and abstracts of the 286 studies were screened based on the predefined inclusion and exclusion criteria. Excluded studies comprised those published before 2020 (n=77) and excluded various resources such as summaries, opinion pieces, periodicals, and internet resources (n=107), leaving 102 studies for full-text assessment. In Stage 2, full-text screening, the two reviewers thoroughly evaluated the full texts of the remaining 102 studies for eligibility based on the inclusion criteria. Excluded studies encompassed those related to non-academic writing contexts like journalism (n=37) and non-university settings (n=22). Any disagreements with the reviewer were resolved through discussion and consultation with a third reviewer when necessary.

After completing the full-text screening stage, we included 43 studies that met the eligibility criteria in the final systematic review. Figure 1 shows the researcher documented the study selection process using a PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flowchart. The researcher used a standardized form to record raw data that captured relevant information such as study characteristics, participant details, interventions, outcomes, and critical findings. Then, the researcher synthesized and analyzed the extracted data using appropriate qualitative or quantitative methods, depending on the nature of the included studies. The systematic review followed the PRISMA guidelines

and CASP checklist to ensure transparency, reproducibility, and methodological rigor in identifying, screening, and synthesizing the relevant literature on artificial intelligence tools and academic writing instruction in higher education.

Findings
Results of the Search and Selection Process
        Figure One presents the results of the search process using the PRISMA flowchart. Before screening, the researcher identified three hundred fifty-seven studies from different databases. Out of the 357 studies, we removed 71 because they were duplicates, resulting in 286 studies. We further screened the remaining 286 studies. Among them, the year of publication for 77 studies was. Afterward, the researcher thoroughly assessed only 102 studies for eligibility, after which we excluded 59 studies (37 related to journalism writing and 22 non-university writing). Consequently, 43 records remained for inclusion in the final systematic review.
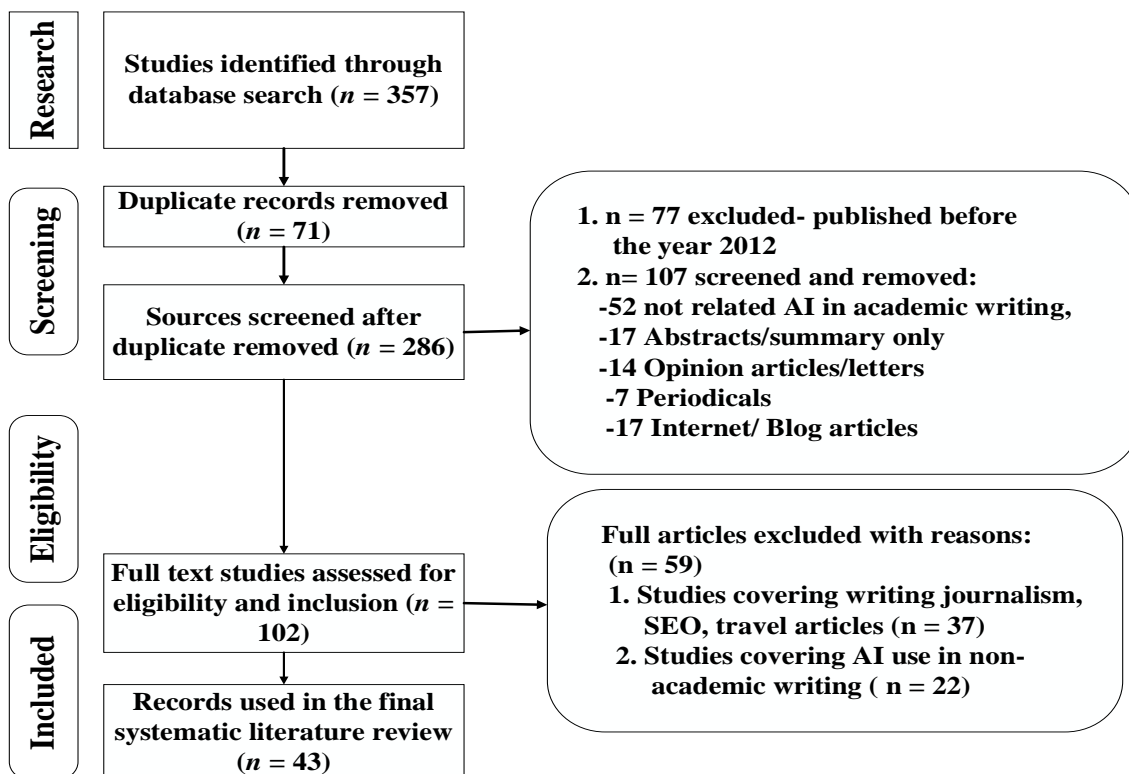

Figure 1. PRISMA flowchart of the article selection process

Impact of AI on Traditional Academic Writing Courses
        Appendix A summarizes the main themes and subthemes on the benefits and drawbacks of AI replacing traditional academic courses. The identified themes included the benefits of conventional writing courses, the potential benefits of AI tools, the limitations of AI writing tools, the benefits of integrating AI tools, and the drawbacks of relying solely on AI tools. First, the benefits of traditional academic writing courses include the development of critical thinking and research skills (Gintin & Barella, 2022; Langum & Sullivan, 2020; Poe, 2022), building student's confidence and voice (Bailey & Nunan, 2023; Chien, 2023; Tardy et al., 2021), and potential facilitation of ethical writing practices (Caprioglio & Paglia, 2023; Salvagno et al., 2023; Scott et al., 2020).

Second, potential benefits of AI tools include enhanced efficiency and automation (Algerafi et al., 2023; Ali et al., 2020; Sajjad et al., 2023), access to instant feedback (Almaiah et al., 2022; An et al., 2023), and accessibility of writing support for a broader spectrum of students (Gayed et al., 2022; Kim et al., 2022; Makarius et al., 2020). Third, possible limitations of AI writing tools include reduced critical thinking and analysis (Lin et al., 2022; Salvagno et al., 2023; Utami et al., 2023), reduced originality and creativity among students (Livberber & Ayvaz, 2023; Makarius et al., 2020), and ethical violations like plagiarism (Almaiah et al., 2022; An et al., 2023; Lee et al., 2023).

Fourth, integrating AI tools with traditional tools could have benefits like efficiency and feedback (Malik et al., 2023; Nazari et al., 2021; Ouyang et al., 2022), overcoming writer's block and creativity in generating initial research ideas (Rohde et al., 2023; Sajjad et al., 2023), and better accessibility to diverse knowledge resources and personalized learning to meet individual needs (Bearman et al., 2023; Chen et al., 2020b; Kuleto et al., 2021). Fifth, AI presents various drawbacks to relying solely on AI tools. These drawbacks include overdependence on technology (Gayed et al., 2022; Ouyang et al., 2022), limited transferable skills (Dong, 2023), unequal access for learners without access to technology (Wang et al., 2023), lack of human element (Utami et al., 2023; Roe et al., 2023), privacy and security concerns (Caprioglio & Paglia, 2023), and possible resistance to Change from educators and students (Pividori & Greene, 2023; Wu et al., 2022).

Insights from the scholarly literature (Appendix A) reveal that Traditional academic writing courses teach critical thinking and communication. AI techniques improve educational writing efficiency and grammar verification. However, these technologies cannot understand complex contexts or stimulate creativity. Using AI with traditional writing can improve efficiency and provide rapid guidance. However, relying solely on AI tools may hinder writing and critical thinking development. As such, this could emphasize the importance of balanced academic writing instruction.

Teacher and Student Perceptions About AI Use in Academic Writing Courses

Appendix B shows findings on the perception of teachers and students regarding AI use in academic writing and its impact on writing, critical thinking, and academic performance. How AI technologies affect students' perception, writing, critical thinking, and academic performance depends on their utilization in education. When appropriately applied, AI technology can help students improve their writing and excel academically, but a balanced approach is needed to teach proper writing and critical thinking.

First, in terms of individual perceptions, Students prefer AI academic writing software for their convenience (Ahmad et al., 2022; Chen et al., 2022; Chounta et al., 2022), while others value the educational opportunities that AI tools offer (Akgun & Greenhow, 2022; Celik et al., 2022; Joshi et al., 2021; Kim et al., 2020). Yet, teachers raise concerns about students becoming overly reliant on AI tools (Chen et al., 2020a; Hwang et al., 2020). Second, teachers and students share that AI impact on writing skills in areas of grammar and style (Chen et al., 2020c; Zheng et al., 2021), natural writing (Ahmad et al., 2022; Joshi et al., 2021; Liu et al., 2023), and individualized learning (Chen et al., 2023; Kim et al., 2020). Third, learners and educators hold that AI influences creative thinking in terms of better and instant feedback (Chiu et al., 2023; González-Calatayud et al., 2021) and improved time management (Akgun & Greenhow, 2022; Fyfe, 2023; Gardner et al., 2021). However, others are cautious that AI risks contributing to a superficial understanding of core academic writing concepts (Akgun & Greenhow, 2022; Braiki et al., 2020).

Pedagogical Implications of Integrating AI Tools into Academic Writing Instruction

Appendix C summarizes findings on the pedagogical implications of integrating AI with academic writing. Potential pedagogical implications relate to issues such as scaffolding and enhanced feedback on mechanics, coherence, and argument structure (Leoste et al., 2021; Kamalov et al., 2023; Nazari et al., 2021), students access personalized learning and accessibility (Bozkurt et al., 2021; Lim et al., 2023; Tedre et al., 2021), and heightened engagement and motivation (Celik et al., 2022; Kim et al., 2022; Liang et al., 2023). In addition, AI could impact pedagogy in terms of developing critical thinking and research skills (Bauer et al., 2023; Bozkurt et al., 2021; Kim et al., 2022;), and promoting collaborative authoring and peer review that could help encourage communication and cooperative learning (Leoste et al., 2021; Xiao & Yi, 2021).

Scholars also emphasize that AI could contribute to effectively designing and implementing academic-assisted modules. For example, this is achieved through matching AI tools to writing talents and learning goals (Alharbi, 2023; Kim et al., 2022), scaffolding, and gradual release of responsibility (Lim et al., 2023; Tang et al., 2023), promoting human-AI collaboration (Bozkurt et al., 2021; George & Wooden 2023), addressing ethical considerations by discussing issues of plagiarism and AI safety, helping students cite AI tools, and write authentically (Ouyang et al., 2022; Xiao & Yi, 2021). Training instructors on AI tools and pedagogy could promote best practices and solve emerging problems (Ouyang & Jiao, 2021), training students on AI tools could help them comprehend these tools' pros and cons (Pataranutaporn et al., 2022), and continuous feedback could ensure suitable integration into academic writing (Cheung et al., 2021; Lim et al., 2023; Raj & Renumol, 2022).

Ethical Implications of Using AI Writing Tools in Universities

Appendix D summarizes the main ethical issues emerging from AI-based writing tools. In elaboration, using AI writing tools in universities raises several ethical implications, including plagiarism, authorship attribution, transparency, and potential biases in the algorithms. Plagiarism may result in students exploiting AI writing tools to produce articles without appropriately acknowledging original authors (Chen et al., 2020b; Kuleto et al., 2021). Authorship attribution could result from the challenges of identifying a written idea's author, which poses difficulties when researchers utilize AI methods (Scott et al., 2020; Ali et al., 2020). Concerns about fairness and accountability may arise due to a lack of transparency in the functioning of AI algorithms (Gayed et al., 2022; Kim et al., 2022; Makarius et al., 2020). AI algorithms can acquire and perpetuate biases in the initially trained data (Utami et al., 2023; Livberber & Ayvaz, 2023; Makarius et al., 2020).

Excessive dependence on AI technologies could hinder the progress of critical thinking and writing abilities (An et al., 2023; Lee et al., 2023). AI systems can handle and retain sensitive data, which might raise privacy concerns (Rohde et al., 2023; Sajjad et al., 2023). The findings show that AI technologies used in academic writing courses raise ethical concerns, particularly about plagiarism, as they may unintentionally produce content that resembles previous work. Insufficient protection of student data gives rise to privacy concerns. Algorithmic bias can sustain inequity, while excessive dependence on AI may impede the cultivation of critical thinking and innovation. There is a need to consider ethical concerns to effectively manage any problems related to using AI writing tools in educational contexts that align with established university policies and educational programs.

Discussion

The primary question of whether Artificial Intelligence (AI) tools are replacing traditional academic writing courses in universities is a complex and multifaceted issue (Almaiah et al., 2022; Kim & Kim, 2022). While AI writing assistants and language models have made significant advancements, most scholars hold that it is unlikely that AI tools will completely replace traditional academic writing courses shortly. The findings echo past research that AI will not likely replace academic writing in the short term (Chocarro et al., 2023; Zhai & Ma, 2022). Instead, a more balanced approach may involve strategically integrating AI assistants as supplementary tools to enhance certain aspects of the writing process while maintaining a strong emphasis on human instruction and guidance (An et al., 2023; Lin et al., 2022; Wongras & Tanantong, 2023; Wu et al., 2022). Ultimately, the role of AI in academic writing instruction may continue to evolve, but human instructors and their expertise in teaching the complexities of academic discourse are likely to remain essential components of university-level writing education (Algerafi et al., 2023; Cheong et al., 2023; Teng et al., 2022; Wilby, 2022). Subsequent sections further discuss the findings in light of the research questions and theoretical framework.

RQ1 explored the extent to which artificial intelligence tools effectively replace traditional academic writing courses in universities and this shift's potential benefits and drawbacks. The findings of this systematic review show a growing consensus among educational scholars and practitioners that although AI programs give quick writing automation in grammatical checks and writing support, they are unable to replicate the comprehensive skill development offered by traditional academic writing courses (Almaiah et al., 2022; An et al., 2023; Aswar & Faraz, 2023; Gayed et al., 2022; Kim et al., 2022). Critics caution that substituting these academic courses entirely with AI tools can weaken the development of critical thinking and creativity (An et al., 2023; Lee et al., 2023; Malik et al., 2023). The possible advantages of AI encompass optimized procedures and immediate feedback (Pividori & Greene, 2023; Wu et al., 2022); however, the disadvantages entail a reduction in students' autonomous writing styles and a decreased emphasis on a comprehensive investigation of the subject matter (Bearman et al., 2023; Chen et al., 2020b; Kuleto et al., 2021). Therefore, while AI writing tools present an opportunity to enhance and personalize writing instruction, these tools cannot replace the critical role of traditional academic writing courses. Instead, the future lies in a balanced approach that leverages the strengths of AI and conventional academic writing courses to create a more effective and engaging learning experience for students.

RQ2 attempted to understand *how educators and students perceive using artificial intelligence tools for academic writing compared to traditional writing courses. How does this impact their writing skills, critical thinking, and academic performance*? Scholars report that traditional academic writing courses are essential for developing students' abilities to communicate effectively and think critically (Livberber & Ayvaz, 2023; Makarius et al., 2020). Moreover, these courses cultivate a solid grounding in language, style, and research procedures, promoting the growth of articulate and well-organized academic works (Gintin & Barella, 2022; Langum & Sullivan, 2020; Poe, 2022). Applying the TAM and UTAUT framework helps explain students' increased uptake of AI in academic writing (Chocarro et al., 2023; Zhai & Ma, 2022). Students perceive that integrating AI tools into academic writing introduces various potential benefits. AI tools can enhance efficiency by automating tasks like grammar and syntax checks,

allowing students to focus on higher-order aspects of writing (Bailey & Nunan, 2023; Chien, 2023; Tardy et al., 2021). Furthermore, AI technologies can facilitate the production of ideas, offer helpful suggestions, and aid in accurate citation, thus optimizing the writing process and enhancing overall quality.

Educators and students view AI tools for academic writing with enthusiasm and caution. While AI brings convenience and efficiency to educational writing projects, concerns arise over potential over-reliance, impacting the writing experience and possibly stifling creativity. Issues with grammar and style accuracy persist, and there's a risk of superficial understanding due to dependency on automated assistance. While personalization and instant feedback are valued, educators worry about the impact on critical thinking. Balancing AI benefits with fostering creative thinking, avoiding dependency, and ensuring time management remains challenging, encouraging a comprehensive viewpoint toward incorporating AI tools in academic writing.

RQ3 intended to identify the pedagogical implications of integrating artificial intelligence tools into academic writing instruction and how educators can effectively design and implement AI-assisted writing modules to enhance student learning and engagement. By incorporating the advantages of both systems, students can benefit from immediate feedback, expert advice, and improved efficiency. Constructivist Learning Theory and communities of inquiry may explain this phenomenon where AI tools potentially augment conventional education by offering supplementary learning materials and facilitating a comprehensive teamwork approach to academic writing (Caprioglio & Paglia, 2023; Salvagno et al., 2023; Scott et al. 2020). Ensuring a thorough and practical approach to academic writing education involves striking a balance between the advantages of AI and the fundamental abilities developed in traditional writing courses (Ali et al., 2020; Sajjad et al., 2023; Makarius et al., 2020). However, researchers observed that overreliance might result in a deterioration of students' cognitive abilities related to analytical reasoning and a diminishment of the individual's originality in written expression (Algerafi et al., 2023; Berssanette & de Francisco, 2022; Lin et al., 2022; Salvagno et al., 2023). For example, AI tools may have limited understanding of subject matter expertise, which can result in potential mistakes or a lack of thorough analysis (Dong, 2023; Nazari et al., 2021; Wang et al., 2023). Excessive dependence on AI technologies may impede the cultivation of a student's distinct writing style and weaken the human element in academic expression.

Incorporating artificial intelligence tools in academic writing has generated varied perceptions among teachers and students compared to traditional writing courses. Educators widely regard AI as a beneficial tool that provides prompt feedback and individualized student assistance (Akgun & Greenhow, 2022; Braiki et al., 2020). For example, AI systems can detect grammatical mistakes, propose enhancements, and optimize the writing process, reducing time consumption for educators and students (Akgun & Greenhow, 2022; Fyfe, 2023; Gardner et al., 2021). Nevertheless, educators raise concerns regarding the possibility of excessive dependence on these technologies, apprehensive that it may lead to a decreased emphasis on fundamental writing abilities.

Students value the simplicity and effectiveness provided by AI tools since this technology provides immediate feedback and adapts to particular writing styles to align with students' needs. Nevertheless, there exists a potential threat that learners may place greater importance on expeditious corrections rather than developing a profound comprehension of language principles and cultivating critical thinking skills (Chen et al., 2020a; Hwang et al., 2020). Some students perceive traditional writing classes, which prioritize manual editing and thorough analysis, as

promoting a more holistic comprehension of the writing process (Chen et al., 2023; Kim et al., 2020). Although AI tools have the potential to improve efficiency and accuracy, students need to find a middle ground between utilizing them for assistance while maintaining traditional writing methods to promote a comprehensive and robust growth of their academic writing skills.

Incorporating AI tools in academic writing training has significant pedagogical ramifications, fundamentally transforming conventional teaching and learning methods. Artificial Intelligence provides customized feedback, assisting students in improving their writing abilities and meeting specific requirements (Kamalov et al., 2023; Nazari et al., 2021). The prompt and comprehensive analyses facilitated by AI tools enable educators to concentrate on fostering students' development of higher-order cognitive abilities, promoting critical analysis and creativity (Berssanette & de Francisco, 2022; Ouyang & Jiao, 2021; Pataranutaporn et al., 2022). To build and deploy AI-assisted writing modules efficiently, educators should initially evaluate the individual requirements of their students.

Customizing AI tools to tackle prevalent writing difficulties, such as grammatical errors, stylistic issues, and organizational shortcomings, guarantees a focused and influential learning encounter. In addition, instructors should prioritize highlighting the collaborative nature of AI, urging students to perceive these technologies as companions in their educational process rather than simply assessors (Bozkurt et al., 2021; Kim et al., 2022; Leoste et al., 2021; Xiao & Yi, 2021). Using AI in writing, such as automated content development or analysis, can also engage students by showing how necessary and valuable these skills are outside of school (Bozkurt et al., 2021; Lim et al., 2023; Tedre et al., 2021). Combining AI and traditional teaching methods creates a comprehensive writing program that prepares students for modern communication. Despite innovative AI-based academic writing, there are potential ethical issues to consider in academic writing.

RQ4 identifies the *ethical implications of using AI writing tools in universities and how these can be addressed or mitigated*. AI tools may generate unattributed work that fails to recognize original authors, making plagiarism and originality of research material problematic (Almaiah et al., 2022; Ouyang et al., 2022). AI-assisted collaborative writing presents authorship attribution issues, making the academic work unauthentic (Rohde et al., 2023; Sajjad et al., 2023). Failure to disclose AI algorithms raises ethical issues of transparency. According to Kim et al. (2022), AI that aids unethical practices compromises education. AI model biases may perpetuate inequality since students from remote areas may lack the technology to access new and emerging educational technologies (Celik et al., 2022; Joshi et al., 2021). AI-driven writing systems may use personal data, raising ethical concerns about privacy and information protection (Cheung et al., 2021). Given these considerations, AI-generated work needs constant monitoring and evaluation to meet academic and ethical standards.

Findings from this systematic review on the impact of AI tools on academic writing instruction in higher education are highly relevant and contribute to the existing body of research on this topic. First, the findings consolidate previous concerns about AI use in higher education. They precisely echo and reinforce the concerns raised in earlier studies regarding the potential ethical issues surrounding using AI writing tools in academia. These concerns include plagiarism, attribution challenges, transparency issues, bias and inequality, privacy violations, and the need for constant monitoring (Almaiah et al., 2022; Celik et al., 2022; Cheung et al., 2021; Joshi et al., 2021; Kim et al., 2022; Ouyang et al., 2022; Rohde et al., 2023; Sajjad et al., 2023). By

consolidating these concerns, the systematic review reinforces the importance of addressing these challenges as AI writing tools become more prevalent in higher education.

Second, the findings comprehensively synthesize the scholarly and practitioner literature on AI and academic writing. While previous studies may have focused on specific aspects or concerns related to AI writing tools (Cheong et al., 2023; Livberber & Ayvaz, 2023; Teng & Wang, 2023; Wilby, 2022), this systematic review provides a comprehensive synthesis of the potential impacts and challenges across various dimensions, including academic integrity, authorship, transparency, bias, privacy, and ethical considerations. Such a holistic approach contributes to a more well-rounded understanding of the implications of AI writing tools in academic settings.

Third, insight from this study augments existing evidence-based guidance on the topic. By systematically reviewing and analyzing the existing literature, the findings offer evidence-based insights and advice for educators, administrators, and policymakers as they integrate AI writing tools into academic writing instruction (Chen et al., 2020a; Gayed et al., 2022). These findings can inform the development of appropriate policies, best practices, and governance frameworks to ensure AI's responsible and ethical use in higher education. The findings help shape future research agendas and guide investigators in addressing this topic's unanswered questions or unexplored aspects.

Fourth, as AI technologies become more accessible, your systematic review findings are timely and highly relevant in the current academic landscape. The results contribute to the ongoing discourse and decision-making processes surrounding the appropriate integration of AI writing tools in higher education curricula while maintaining academic integrity and fostering critical thinking skills (Salvagno et al., 2023; Utami et al., 2023). In summary, insights from the current systematic review findings on the impact of AI tools on academic writing instruction in higher education are highly relevant and contribute to the existing body of knowledge by reinforcing previous concerns, providing a comprehensive synthesis, offering evidence-based guidance, identifying research gaps, and addressing a timely and pertinent issue in the field of higher education.

Conclusion

The systematic review examined whether AI tools are replacing university academic writing courses. The findings indicate that AI tools are not supplanting these courses, which play a crucial role in developing students' critical thinking, research, and communication abilities beyond the basic mechanics of writing that AI can automate. Academic writing involves higher-order skills like integrating material, formulating arguments, and adhering to scholarly conventions that AI may not fully capture. While AI can aid in tasks like grammar checking, plagiarism detection, and generating introductory text, it cannot cultivate the deep comprehension and analysis that academic writing courses aim to foster. These courses emphasize innovative thinking, persuasive reasoning, and accurate referencing, essential academic writing components that AI tools lack.

Rather than replacing academic writing courses, AI is more likely to be integrated as a supplementary resource to enhance student learning and writing proficiency. However, completely substituting courses with AI is improbable, given the complex nature of academic writing and the need for comprehensive student development. The role of AI will likely shift towards augmenting learning while addressing ethical concerns around privacy, plagiarism, authorship attribution, and originality. A balanced approach that integrates AI judiciously to complement traditional

instruction rather than supplanting it may be a more productive policy for universities. In conclusion, AI tools are transforming academic writing. Still, they are effective as supplementary aids rather than replacements for human-guided writing courses that cultivate essential higher-order skills beyond AI's current capabilities.

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Appendices
Appendix A
Benefits and Drawbacks of AI Replacing Traditional Academic Courses

Theme	Subtheme	Findings	References
Benefits of traditional academic writing courses	Development of critical thinking and research skills	Feedback and conversations in these courses help students examine material, make arguments, and support them with evidence. These skills are crucial for school and life.	Gintin & Barella, 2022; Langum & Sullivan, 2020; Poe, 2022
	Builds student's confidence and voice	Writing courses enable students to experiment, find their voice, and develop their writing style. AI can't match instructors' tailored feedback on students' writing.	Bailey & Nunan, 2023; Chien, 2023; Tardy et al., 2021
	Appreciating Ethical Writing Practices	Plagiarism, citation formats, and appropriate research in writing courses: This knowledge is essential for academic honesty, ethical behavior, and the lack of AI tools.	Caprioglio & Paglia, 2023; Salvagno et al., 2023; Scott et al., 2020
Potential Benefits of AI Tools	Efficiency and Automation	Certain aspects of the writing process, including grammar and style checks, can be automated by AI tools, enabling students to detect and rectify errors more efficiently.	Algerafi et al., 2023; Ali et al., 2020; Sajjad et al., 2023
	Instant Feedback	AI can deliver prompt feedback on writing assignments, enabling students to promptly identify and rectify their errors.	Almaiah et al., 2022; An et al., 2023
	Accessibility	AI tools have the potential to enhance the accessibility of writing support for a broader spectrum of students, including learners who may encounter difficulties in traditional writing courses.	Gayed et al., 2022; Kim et al., 2022; Makarius et al., 2020
	Critical thinking and analysis	AI lacks the critical thinking and analysis skills needed for high-quality academic writing, resulting in	Lin et al., 2022; Salvagno et al.,

Themes	Subthemes	Findings	References
		grammatical errors. Complex reasoning, data analysis, and distinct viewpoints are skills best developed in specialist courses.	2023; Utami et al., 2023
Limitations of AI writing tools	Originality and creativity	AI is derivative and relies on existing data and patterns. AI may struggle with innovative ideas, complex perspectives, and creative expression, all essential to academic writing.	Livberber & Ayvaz, 2023; Makarius et al., 2020
	Ethical considerations	Abuse and plagiarism of AI tools raise ethical concerns. Without proper guidance, students would only employ AI drafts, hindering their honest writing and critical thinking skills.	Almaiah et al., 2022; An et al., 2023; Lee et al., 2023
Potential benefits of integrating AI tools	Efficiency and feedback	AI systems can offer immediate feedback on grammar, mechanics, and sentence structure, allowing educators to allocate more time to providing higher-level input on content and organization.	Malik et al., 2023; Nazari et al., 2021; Ouyang et al., 2022
	Overcoming writer's block	AI can generate outlines, suggest writing prompts, and provide different writing styles, potentially helping students overcome creative blocks and get started.	Rohde et al., 2023; Sajjad et al., 2023
	Accessibility and personalized learning	AI-powered platforms can personalize learning by adapting to individual students' needs and providing targeted feedback, potentially making writing instruction more accessible and practical.	Bearman et al., 2023; Chen et al., 2020c; Kuleto et al., 2021
Drawbacks of relying solely on AI tools	Overdependence on technology	Overreliance on AI may reduce students' intrinsic motivation to write autonomously, limiting their creative and independent writing.	Conijn et al., 2023; Gayed et al., 2022; Ouyang et al., 2022
	Limited transferable skills	AI-generated work may lack the critical thinking and analysis that companies and graduate programs value.	Dong, 2023
	Unequal access and bias	AI tools may not be available to all students, worsening academic gaps.	Wang et al., 2023
	Lack of Human Element	Writing is creative and goes beyond technical accuracy. AI techniques cannot mimic the personal touch of instructor-student interactions in traditional courses.	Utami et al., 2023; Roe et al., 2023
	Privacy and Security Concerns	AI tools may share sensitive data, posing privacy and security concerns for student data.	Caprioglio & Paglia, 2023
	Resistance to Change	There may be resistance from educators and students who value the traditional approach to teaching writing and see the human touch as irreplaceable.	Pividori & Greene, 2023; Wu et al., 2022

Appendix B
Perception of Teachers and Students about AI Use in Academic Writing Courses

Themes	Subthemes	Findings	References
Perceptions	Convenience and efficiency	Students prefer AI academic writing software for their convenience. These tools help learners improve their work with quick grammatical and style suggestions.	Ahmad et al., 2022; Chen et al., 2022; Chounta et al., 2022
	Writing experience	Some students value the educational opportunities that AI tools offer. Students can engage in a more iterative writing process by receiving immediate feedback and learning from their errors.	Akgun & Greenhow, 2022; Celik et al., 2022; Joshi et al., 2021; Kim et al., 2020

	AI reliance	Teachers raise concerns about students becoming overly reliant on AI tools, potentially hindering the development of their independent writing skills.	Chen et al., 2020a; Hwang et al., 2020
Impact on writing skills	Grammar and style	Teachers express that AI tools can enhance students' grammar and style, leading to cleaner and more polished writing.	Chen et al., 2020b; Zheng et al., 2021
	Dependency	Teachers are concerned students may overuse AI suggestions without understanding the corrections. Their natural writing talents may suffer.	Ahmad et al., 2022; Joshi et al., 2021; Liu et al., 2023
	Personalization	Students perceive that some AI tools provide individualized writing suggestions based on writing patterns; this can improve learners' writing by meeting their individual needs.	Chen et al., 2023; Kim et al., 2020
Creative thinking	Instant Feedback	AI tools provide immediate feedback, helping students evaluate their writing; this can improve decisions as they assess and accept or reject AI-generated recommendations.	Chiu et al., 2023; González-Calatayud et al., 2021
	Risk of Superficial Understanding	AI tools may cause students to address surface-level concerns without thoroughly interacting with the information, impairing critical thinking.	Akgun & Greenhow, 2022; Braiki et al., 2020
Time Management		AI systems may improve academic achievement by helping students manage their time, especially under tight deadlines.	Akgun & Greenhow, 2022; Fyfe, 2023; Gardner et al., 2021

Appendix C
Pedagogical Implications of Integrating AI into Academic Writing Courses

Themes	Subthemes	Findings	References
Pedagogical implications	Scaffolding and enhanced feedback	AI tools can provide immediate, tailored feedback on mechanics, coherence, and argument structure. Tools with appropriate feedback mechanisms that follow educational concepts are needed. Educators can then improve AI feedback by analyzing logic, evidence, and critical thinking.	Leoste et al., 2021; Kamalov et al., 2023; Nazari et al., 2021
	Personalized learning and accessibility	AI-based platforms may customize learning courses and exercises for different learning styles. Use accessible tools and offer alternative learning pathways to learners who may not benefit from AI-driven tasks to achieve inclusivity.	Bozkurt et al., 2021; Lim et al., 2023; Tedre et al., 2021
	Boosting engagement and motivation	Game elements, progress tracking, and interactive feedback can encourage and interest students. However, teachers must balance these elements with authentic writing activities, honest input, and proofreading.	Celik et al., 2022; Conijn et al., 2023; Kim et al., 2022; Liang et al., 2023
	Developing critical thinking and research skills	Students can use AI techniques to analyze sources and find important material. Metacognitive training is possible, but educators must stress autonomous judgment and source analysis to avoid students using AI algorithms.	Bauer et al., 2021; Bozkurt et al., 2021; Kim et al., 2022;
	Promoting collaboration	Some AI platforms allow collaborative authoring and peer review. These can help promote communication and	Leoste et al., 2021; Xiao & Yi, 2021

	and peer learning	cooperative learning, but instructors should offer clear guidelines and support to prevent misuse.	
Effective design and implementation of AI-assisted modules	Clear learning objectives	Match AI tools to writing talents and learning goals. Choose tools that support curriculum and assessment. Set learning objectives for integrating AI into writing education. Use AI to improve writing, not replace it.	Alharbi 2023; Kim et al., 2022;
	Scaffolding and gradual release of responsibility	Teachers should begin with AI-guided exercises for basic skills, then progress to open-ended challenges where students apply their learning autonomously.	Lim et al., 2023; Tang et al., 2023
	Promoting human-AI collaboration	Explain that AI is a tool, not a substitute, for critical thinking and decision-making. They teach students to analyze and critically assess AI feedback to make educated decisions.	Bozkurt et al., 2021; George & Wooden 2023
	Addressing ethical considerations	Educators could discuss plagiarism and AI safety, help students cite AI tools, and write authentically.	Ouyang et al., 2022; Xiao & Yi, 2021
	Teacher training and support	Train instructors on AI tools and pedagogy to integrate them. Create communities to share best practices and solve problems.	Ouyang & Jiao, 2021
	Training and Orientation	Train and educate students on AI tools. Help them comprehend these tools' pros and cons.	Pataranutaporn et al., 2022
	Feedback Integration	Make AI-generated feedback part of a feedback loop that incorporates educator input. More comprehensive evaluations result from this hybrid method.	Cheung et al., 2021; Raj & Renumol, 2022
	Iterative Improvement	Continuously evaluate, develop, and improve AI-assisted modules based on student and educator feedback.	Lim et al., 2023

Appendix D
Ethical Implications of Using AI Writing Tools in Universities

Themes	Issues	Findings	References
Plagiarism and originality	Issue	Students may exploit AI writing tools to produce articles without appropriate acknowledgment.	Chen et al., 2020c; Kuleto et al., 2021
	Mitigation	Teachers must convey university policies regarding plagiarism and academic integrity effectively.	
Authorship attribution	Issue	-Identifying the genuine author of a written item can pose difficulties when using AI methods.	Scott et al., 2020; Ali et al., 2020
	Mitigation	-It is necessary to require students to disclose their use of AI tools when submitting assignments	
Transparency	Issue	-The lack of transparency in the functioning of AI algorithms might lead to concerns about fairness and accountability.	Gayed et al., 2022; Kim et al., 2022; Makarius et al., 2020
	Mitigation	-To enhance transparency, it is advisable for students to utilize AI writing tools that possess precise and meticulously documented algorithms.	
Potential Biases	Issue	-AI algorithms can acquire and continue biases in the data upon which their training occurs.	Utami et al., 2023 Livberber & Ayvaz, 2023; Makarius et al., 2020
	Mitigation	-Teachers should regularly enhance AI writing tools to minimize biases and improve performance. -To mitigate bias, ensuring that the training data utilized for AI models is diverse and representative is crucial.	

Academic Integrity	Issue	-Excessive dependence on AI technologies could hinder the progress of critical thinking and writing abilities.	An et al., 2023; Lee et al., 2023
	Mitigation	-Educators need to promote using AI writing tools as extra resources, highlighting the significance of autonomous thinking and ingenuity. -Create tasks that provide precedence to cultivating critical thinking, research, and writing abilities rather than solely focusing on content production.	Nazari et al., 2021; Ouyang et al., 2022
Privacy Concerns	Issue	-AI systems can handle and retain sensitive data, which might raise privacy concerns.	Rohde et al., 2023; Sajjad et al., 2023
	Mitigation	-Select AI products that possess robust security protocols and transparent privacy policies. -Choose technologies that do not save student data beyond what is essential for the current work.	Poe, 2022 Chien, 2023; Tardy et al., 2021