

Review

The Impact of Artificial Intelligence Tools on Developing and Improving Academic Writing

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Abstract: This study explores how artificial intelligence (AI) tools influence the development and improvement of academic writing practices in higher education. To address this objective, a systematic literature review (SLR) was conducted to examine scholarly work related to the use of AI in academic writing. An initial search identified 199 documents, from which 32 studies were retained after applying predefined inclusion and exclusion criteria based on methodological rigor, relevance, and thematic alignment with the research focus. The review integrates systematic literature review procedures with bibliometric and narrative synthesis approaches to examine publication patterns, leading countries and institutions, dominant theoretical perspectives, and emerging research directions in this field. The findings indicate that AI tools increasingly support academic writing through functions such as language generation, editing assistance, idea organization, and improved research efficiency. At the same time, literature highlights important ethical, methodological, and pedagogical challenges that accompany the growing adoption of AI technologies in academic environments. The analysis further identifies several research gaps, particularly in relation to academic integrity, institutional governance, and the development of AI literacy among students and researchers. In response, the study proposes a set of practical recommendations aimed at promoting responsible and effective use of AI in academic writing. These include the development of structured training programmes, clearer institutional guidelines on ethical AI use, and stronger collaboration among educational institutions to enhance responsible technological integration and support the advancement of scientific research.

Keywords: Artificial Intelligence; Academic Writing; Systematic Literature Review (SLR)

1. Introduction

With the rapid developments that the world is witnessing, especially in the technological fields, artificial intelligence appears as one of the most prominent tools that has shown a major transformation and tremendous development in the amount of information and how it is organized, formulated, and published. Among the most prominent areas of development is the field of artificial intelligence and its applications in academic writing, as opposed to the writing that depends on human effort only, starting with writing ideas, searching for references, and ending with reviewing and documenting them. There are processes and age models, intelligent correction and editing applications that represent supportive tools for improving the quality of texts, accelerating scientific production processes, and even providing equal opportunities for non-English speaking students and researchers [1]. Recent research emphasizes that integrating artificial intelligence tools in higher education significantly improves learners' engagement, motivation, and performance when instructors effectively employ AI-based systems to support learning [2]. Parallel evidence from accounting and finance education demonstrates that the integration of digital

and hybrid learning environments significantly reshapes student engagement patterns and academic performance, reinforcing the broader transformation of higher education through technological adoption [3].

Leadership and institutional culture play a pivotal role in shaping how technology and artificial intelligence are perceived in higher education, as authentic and transformational leadership have been shown to inspire innovation and creativity in academic settings [4]. The necessity has arisen to improve the quality of academic production, considering the enormous problems that require research, to find quick solutions, as well as to reduce the gaps between English-speaking and non-English-speaking researchers. In the context of Omani higher education, fostering motivation and productivity among faculty and students remains essential for leveraging emerging technologies like AI to enhance teaching and research outcomes [5]. Recent studies in Oman's higher education context emphasize that motivation and academic integrity are deeply influenced by how students perceive fairness and support in technology-integrated learning environments, which include AI-based writing assistance [6]. This has led many students and researchers to utilize artificial intelligence tools that help organize ideas, edit texts, summarize articles, and even generate research questions [7]. Despite this rapid adoption, the current academic discourse remains fragmented, with limited synthesis of theoretical lenses, methodological approaches, and ethical safeguards in AI-assisted scholarly writing. Existing studies primarily explore tool effectiveness or student attitudes, yet few integrate conceptual, ethical, and pedagogical dimensions into a unified framework. Accordingly, this study conducts a rigorous systematic review to bridge this gap and present a holistic understanding of AI's role in academic writing. The study included students at the University of Ibadan; approximately 77% of participants relied on tools such as ChatGPT to improve their writing, emphasizing that their use helps facilitate the thinking and writing processes and saves editing and correction time. This aligns with evidence that the perceived usefulness and ease of use of AI-powered systems directly influence students' willingness to adopt them for academic tasks [2].

From a theoretical standpoint, AI in academic writing intersects with learning theories such as constructivism, cognitive load theory, and self-regulated learning frameworks, underscoring that technology must augment — rather than replace — human cognitive processes. In the educational field, research indicates that the thoughtful use of these tools can enhance students' critical and analytical thinking abilities if they are integrated within clear educational contexts, because they are not left as independent sources without framing [8]. Studies have shown that an instructor's digital competence plays a crucial role in shaping students' perceived ease of use and satisfaction when engaging with AI-enhanced educational environments [2]. Studies on blended and hybrid learning models demonstrate that digital tools, including AI-driven applications, enhance students' analytical and reflective capacities when embedded within well-structured pedagogical frameworks [9]. Researchers have called for employing artificial intelligence as an educational tool that complements learners' cognitive skills, functioning as an assistant rather than a substitute for them [10]. However, some studies have warned against the risk of excessive reliance on these tools, which may lead to the production of texts lacking reflective depth and scientific originality [11].

On the ethical side, the use of artificial intelligence in academic writing raises concerns about originality, intellectual property rights, and transparency. Institutional studies in the Omani higher education context further emphasise that strengthening academic integrity requires culturally responsive engagement strategies and clear ethical frameworks to prevent technological misuse in scholarly work [12]. A recent report highlighted the importance of disclosing the use of artificial intelligence tools in research papers and clearly documenting their role to avoid confusion that may lead to suspicions of plagiarism or scientific misinformation [13].

Due to the importance of using artificial intelligence tools and utilizing them in a way that improves their quality and the accuracy of their results [14], emphasizes the necessity of including "artificial literacy" within university curricula, to teach students how to use them, understand their limitations, deal with their outputs as preliminary drafts that can be reviewed, not final products, and train staff. Several educational studies have recommended the integration of artificial intelligence tools into academic practices and highlighted the importance of guiding students on their effective use [15]. Moreover, studies stress that the development of AI literacy should be complemented by fostering a culture of sustainability-oriented thinking, where technology serves academic ethics and societal responsibility [16].

Based on the above, this study aims to discuss artificial intelligence and its applications in academic writing. It reviews the literature studies that dealt with this topic and explores the dimensions, aspects, and challenges of its use in the future development of these tools in the field.

2. Research Questions

- (1) What Publishing trends, countries, influential authors, influential institutions, and keywords have helped clarify the complementary relationship between AI tools and academic writing?
- (2) What are the main theories in the field of artificial intelligence research and academic writing?
- (3) What are the most common research instruments in the field of artificial intelligence research and academic writing?
- (4) What is the most common research statistical analysis in the field of artificial intelligence research and academic writing?
- (5) What are the highlighted research gaps in the field of artificial intelligence research and academic writing?
- (6) What are the future agenda and recommendations in the field of artificial intelligence research and academic writing?

3. Materials and Methods

This review aims to explore the relationship between artificial intelligence tools and academic writing. To achieve this objective, a review using the Scopus database was conducted on 20 May 2025. Preferred Reporting Items were utilized for Systematic reviews and the PRISMA framework in this study.

3.1. Identifications

Firstly, the core search string TITLE-ABS-KEY (AI AND academic AND writing) was applied to retrieve studies explicitly addressing artificial intelligence in academic writing contexts. The initial search after utilizing these two keywords was 879 documents.

From the initial 879 records retrieved, 680 were excluded at the database filtering stage through predefined Scopus filters (publication year, document type, language, and subject area), resulting in 199 records eligible for title and abstract screening. The primary reasons for exclusion were the lack of focus on artificial intelligence tools, the absence of relevance to academic writing, and targeting non-academic populations or unrelated educational levels. In the identification phase, the initial exclusion process was systematically embedded within the Scopus search strategy through the application of predefined inclusion and exclusion parameters. The search was limited to peer-reviewed journal articles published between 2020 and 2024, written in English, and classified within the subject areas of Social Sciences, Computer Science, and Arts and Humanities. It is important to clarify that references published in 2025 were cited in the Introduction and Discussion sections solely for contextual framing and theoretical positioning. These studies were not part of the systematic review corpus and were excluded from the PRISMA selection process. Additionally, the search query was carefully developed to capture studies explicitly addressing artificial intelligence in relation to academic writing or higher education. These criteria served as an integrated filtering mechanism at the database level, allowing for the preliminary removal of irrelevant records prior to manual screening procedures. A final cross-verification was conducted to ensure full consistency between all in-text citations and the reference list. Of the total 49 references cited in this manuscript, 81.6% (n = 40) were published between 2020 and 2024 and form part of the systematic corpus, while 18.4% (n = 9) were published in 2025 and were used exclusively for contextual discussion. No 2026 publications were included in the review dataset.

3.2. Screening

Secondly, 199 articles remained. In this study, both bibliometric analysis and systematic literature review (SLR) analysis were conducted. For the bibliometric review, the full set of 199 articles was included. In the second phase, full-text retrieval was initiated; however, 95 records could not be retrieved. Therefore, 104 articles were successfully downloaded. After running a full-text screening, 41 articles were excluded. Although screening was conducted independently by two reviewers, no formal inter-rater reliability coefficient (e.g., Cohen's kappa) was calculated. This absence may limit reproducibility and is acknowledged as a methodological limitation.

3.3. Inclusion

In this phase, the researchers worked collaboratively to guarantee the results in the quality assessments phase. The first and final phase included 104 articles; after the first screening (scanning), the results were around 63

articles. After detailed analysis, 31 articles were excluded for these 3 reasons: (Reason 1, n =15, AI-focused studies lacking relevance to academic writing; Reason 2, n = 5, non-empirical review articles; Reason 3, n = 11, different field). Finally, 32 articles were included as the most relevant to the study objective (see **Figure 1**). The results of a systematic literature review, based on the 32 selected articles, were applied to address the research questions and extract the results described in the introduction and reported according to PRISMA guidelines [17]. **Figure 1** shows the PRISMA framework applied in this research. The PRISMA procedure was implemented through four distinct stages: (1) database-level filtering using predefined inclusion criteria, (2) title and abstract screening, (3) full-text eligibility assessment, and (4) final inclusion following quality evaluation.

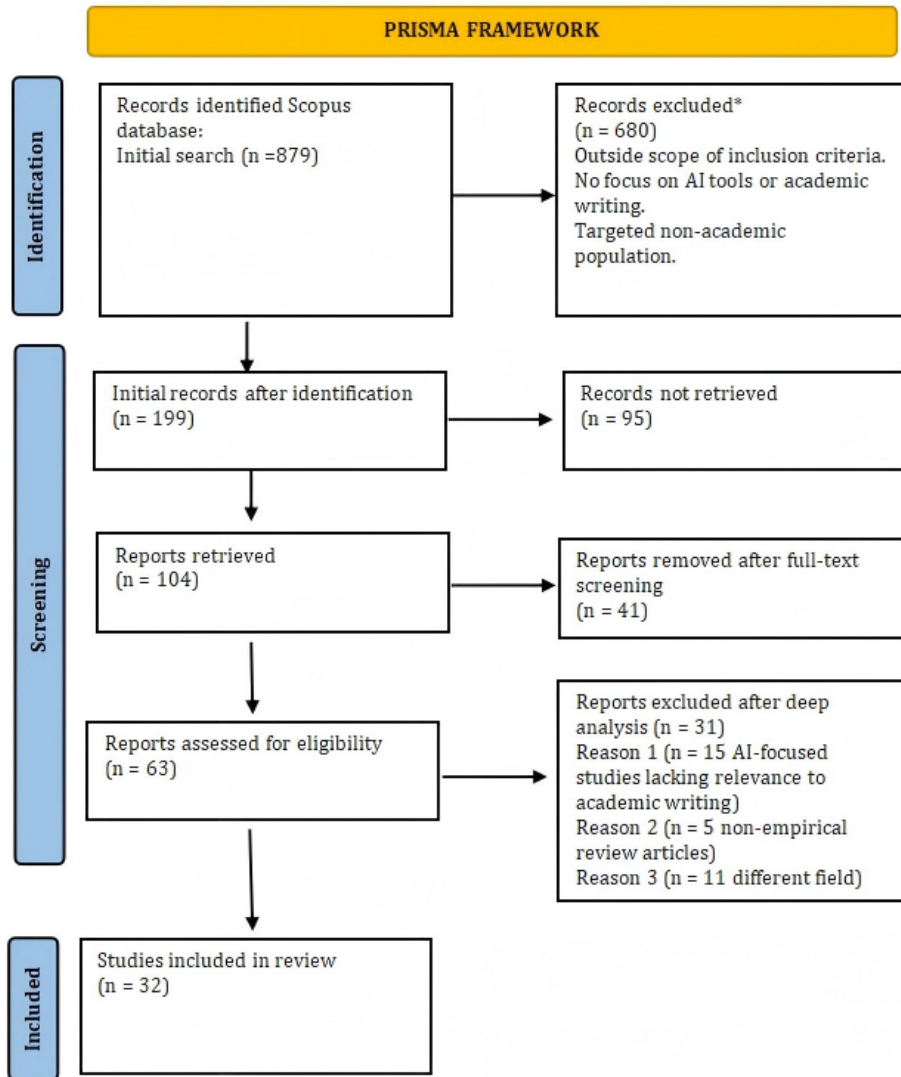


Figure 1. PRISMA framework for this review.

Note: *All initial screening and exclusions were conducted manually by two independent reviewers using the built-in search filters in the Scopus database (e.g., by publication year, subject area, language, document type, and keywords). No automation tools were used.

3.4. Search Strategy

TITLE-ABS-KEY (“artificial intelligence” OR “AI” OR “generative AI” OR “large language model*” OR “ChatGPT”) AND (“academic writing” OR “scientific writing” OR “research writing”)
 AND PUBYEAR > 2019 AND PUBYEAR < 2025
 AND DOCTYPE (ar)
 AND LANGUAGE (English)

3.5. Inclusion and Exclusion Criteria

Criteria for inclusion and exclusion were applied through an initial review that included 879 documents to identify the most relevant studies to the topic of artificial intelligence and its applications in academic writing. The criteria stipulated that the studies published in peer-reviewed scientific journals or reliable academic sources (LIMIT TO (DOCTYPE, “ar”)) and focus directly on the use of artificial intelligence models such as large language models to improve or support the quality of academic writing. The search was also limited to studies published in English (LIMIT TO LANGUAGE “English”), with relevant fields identified to include computer science, applied linguistics, social sciences and humanities, and the arts (LIMIT-TO (SUBJAREA, “SOC”) OR LIMIT-TO (SUBJAREA, “COMP”) OR LIMIT-TO (SUBJAREA, “ARTS”) (AND (LIMIT-TO (DOCTYPE, “ar”)))). After applying these criteria, the number of documents has been reduced to 199 studies eligible for preliminary analysis, and at this stage, the full texts of those studies have been uploaded and analysed; however, only 32 studies have been selected for in-depth and comprehensive analysis (**Appendix A Table A1**). The inability to retrieve 95 records due to access limitations may introduce potential retrieval bias, as relevant studies could not be evaluated at the full-text stage. This limitation is acknowledged and considered in the interpretation of findings.

This final filtering came as a result of multiple factors, including the difficulty of accessing some studies due to institutional restrictions, the lack of availability of the full text of some documents, as well as the incompatibility of the content of several studies with the approved analytical framework that requires a clear relationship between artificial intelligence and academic writing, and to ensure transparency and scientific honesty. The reasons for excluding each study were documented at the final screening stage. **Table 1** presents a summary of the inclusion and exclusion criteria that were adopted in this systematic review.

Table 1. Inclusion and Exclusion criteria.

No.	Inclusion Criteria	Exclusion Criteria
1	Research period (2020–2024)	Studies published before 2020 or after 2024 were excluded.
2	Artificial Intelligence and Academic Writing	Studies not explicitly addressing both AI and academic writing were excluded.
3	Journal articles	Conferences, profiles, blogs, theses, and book chapters were excluded.
4	English language	Any other language was excluded.
5	Three subject areas were included: “social science, computer science and arts and humanities.”	Studies outside these three subject areas were excluded.

3.6. Data Collection and Synthesis

The final selected articles were collected and organized manually. The researcher evaluated the relevance of each article based on the inclusion and exclusion criteria. Then, the relevant articles were extracted, which amounted to 32 articles, from which the authors, publication year, theory, study tools, methodology, statistical methods, research gaps, agenda, and future recommendations were extracted (**Appendix A**).

3.7. Quality Assessment

The quality assessment process for the selected articles was carried out manually, applying procedures for quality assessments to ensure the reliability and credibility of the literature contained in the study. To strengthen reliability, articles were independently reviewed by multiple coders, and disagreements were resolved through consensus to ensure methodological transparency and reduce reviewer bias. A total of 32 articles were eventually selected.

A systematic procedure was applied to examine the quality of articles, where each item was evaluated according to a previously identified set of criteria. These criteria included: suitability of the research, scientific soundness of the approach, reliability of references, integrity of results, and overall impact on the field of artificial intelligence and academic writing. Each item was read carefully, and then the important items were examined twice to ensure accuracy and reliability in the research. The articles that did not meet the criteria established in this evaluation were eliminated, and thanks to this rigorous procedure, only the most reliable and relevant papers to the research study were included, ultimately concluding in the final compilation, which amounted to 32 articles of exceptional quality for the present study.

3.8. Data Analysis and Synthesis

A narrative synthesis approach was applied to analyze and summarize the results from the 32 selected articles, identifying theoretical integration, patterns, gaps, and future recommendations related to the integration of IDMs and theories of educational technology and writing. This synthesis contributed to forming a comprehensive view of the state of knowledge in this field of study.

4. Results

This section presents the main findings, focusing on the relationship between the use of artificial intelligence (AI) applications and their integration into academic writing. The study aimed to understand this relationship by identifying influencing factors, highlighting strategies and methods for integrating these two areas, and examining strengths and limitations of current AI-based academic writing models. Additionally, outcomes and potential implications of such applications were examined. The following subsections explore these aspects, addressing the research questions and providing insights into the importance of using AI applications in academic writing across diverse educational contexts.

4.1. What Publishing Trends, Countries, Influential Authors, Influential Institutions, and Keywords Have Helped Clarify the Complementary Relationship between AI Tools and Academic Writing?

To clarify the motivations and foundations behind the integration of AI tools in academic writing within higher education institutions, the roles played by key institutions and individuals were examined. This part of the study aims to uncover the institutional and geographical factors that have influenced the emergence of this technological approach to academic writing. It also highlights prominent authors and researchers whose work has had a notable impact on AI-based academic writing in higher education settings.

Moreover, the study traces the timeline of research contributions, with a particular focus on the increasing annual output in this rapidly evolving field. Through in-depth analysis of these factors, a clear and comprehensive picture is provided of scholarly contributions that have reshaped academic writing from a technological perspective within higher education.

4.1.1. Publishing Trends in Artificial Intelligence and Academic Writing over the Past Five Years

Figure 2 presents the yearly distribution of publications within the 199-article corpus covering the period 2020–2024. Publication activity was comparatively limited during the early stage of the period (2020–2021) and increased progressively in subsequent years, with the highest concentration of studies recorded in the most recent year of the review window. This upward trajectory reflects the growing scholarly attention toward generative artificial intelligence and its applications in academic writing within higher education contexts.

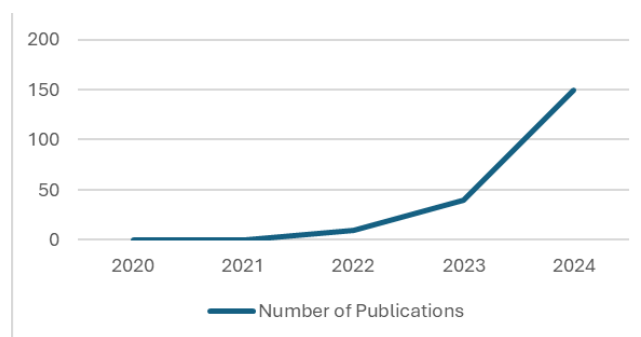


Figure 2. Publishing trends in AI and academic writing over the past five years.

4.1.2. The Countries or Regions Leading in Research Related to AI and Academic Writing

The following **Figure 3** indicates the leading countries or regions in the field of writing scientific research related to artificial intelligence and academic writing. The table shows that the leading country in writing and

publishing in this field is the United States, with more than 46 published papers, followed by Canada with 17 articles. The countries that recorded the least in publishing in this field were India and the Philippines, with 16 published papers.

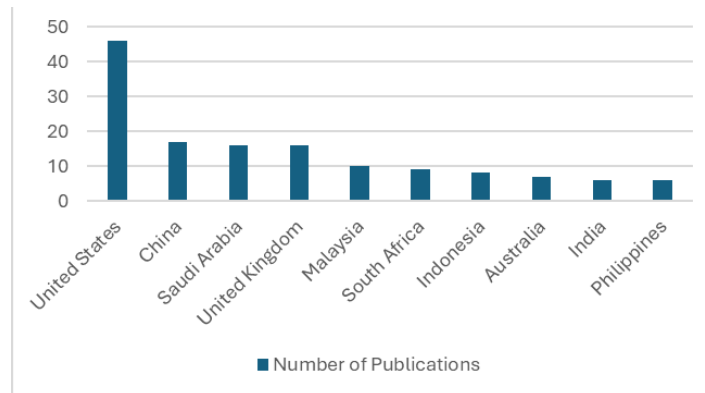


Figure 3. Countries leading in research related to AI and Academic Writing.

4.1.3. The Most Influential Author in AI and Academic Writing

The following **Table 2** presents the most prolific and influential authors in the field of academic writing and artificial intelligence. Through the data in the table, it is possible to compare various indicators such as the number of publications (TP), the total number of citations (TC), the H-index, and the most cited paper. Leading the list is Kong, Siu Cheung, who is recognized as the most prolific and influential author in the field. He has published 180 papers (TP) and received 2,684 citations (TC). He also has the highest H-index at 28, and his most cited paper has been cited 76 times. He is affiliated with the Education University of Hong Kong. Coming in second is Khlaif, Zuheir N., with 55 publications (TP), 899 citations (TC), an H-index of 16, and his most cited paper has been cited 74 times. He is affiliated with An-Najah National University in Palestine. Chaka ranks third, with 51 publications (TP), 540 citations (TC), an H-index of 13, and his most cited paper has 83 citations. He is affiliated with the University of South Africa. In fourth place is Alafnan, Muhammad Awad, with 27 publications (TP), 377 citations (TC), an H-index of 8, and his most cited paper has 21 citations. He is affiliated with the American University of the Middle East in Kuwait. Abdulkarim Ayyoub ranks fifth, with 22 publications (TP), 172 citations (TC), an H-index of 7, and his most cited paper has 74 citations. Regarding the less influential researchers, Nazim Mohd and Ali Abbas Falah Alzubi have a good number of publications (27 and 37, respectively), but they do not have the same level of citations or impact compared to the top five. Lastly, Khan, Soada Idris and Mohammad, Taj have the lowest citation counts and impact indices.

Table 2. Influential authors in AI and Academic Writing.

No.	Authors	Scopus Author ID	TP*	TC*	H Index*	Most Cited Article	Citation Count	Affiliation
1	Khan, Soada Idris	58262216000	6	7	2	Examining EFL Students' Motivation Level in Using QuillBot to Improve Paraphrasing Skills.	2	Najran University, Najran, Saudi Arabia.
2	Mohammad, Taj	57883711300	9	14	2	Examining EFL Students' Motivation Level in Using QuillBot to Improve Paraphrasing Skills.	2	Najran, Saudi Arabia.
3	Nazim, Mohd	57366723900	27	39	3	Examining EFL Students' Motivation Level in Using QuillBot to Improve Paraphrasing Skills.	2	Najran University, Najran, Saudi Arabia.
4	Alzubi, Ali Abbas Falah	57207623759	37	131	6	Examining EFL Students' Motivation Level in Using QuillBot to Improve Paraphrasing Skills.	2	Najran University, Najran, Saudi Arabia.
5	Alafnan, Mohammad Awad	56946893900	27	377	8	Do Artificial Intelligence Chatbots Have a Writing Style? An Investigation into the Stylistic Features of ChatGPT-4.	21	American University of the Middle East, Al Ahmadi, Kuwait.

Table 2. Cont.

No.	Authors	Scopus Author ID	TP*	TC*	H Index*	Most Cited Article	Citation Count	Affiliation
6	Ayyoub, Abdalkarim	57210107359	22	172	7	The Potential and Concerns of Using AI in Scientific Research: ChatGPT Performance Evaluation.	74	An-Najah National University, Nablus, Palestine.
7	Chaka, Chaka	36650232200	51	540	13	Detecting AI content in responses generated by ChatGPT, You Chat, and Chat Sonic: The case of five AI content detection tools.	83	University of South Africa, Pretoria, South Africa.
8	Hattab, Muayad K	57204036384	11	111	5	The Potential and Concerns of Using AI in Scientific Research: ChatGPT Performance Evaluation.	74	An-Najah National University, Nablus, Palestine
9	Khlaif, Zuheir N.	36682701800	55	899	16	The Potential and Concerns of Using AI in Scientific Research: ChatGPT Performance Evaluation.	74	An-Najah National University, Nablus, Palestine.
10	Kong, Siu Cheung	7203044800	180	2,684	28	Evaluating an Artificial Intelligence Literacy Programme for Developing University Students' Conceptual Understanding.	76	The Education University of Hong Kong, Hong Kong, China.

Note: TP* (Total Publications), TC* (Total Citations), and H Index* values represent lifetime Scopus author metrics and not productivity limited to the 199-article corpus. These indicators are provided for contextual influence mapping rather than corpus-restricted bibliometric measurement. Source: Scopus database (2020–2024).

4.1.4. The Most Influential Institution That Is Prominent in AI and Academic Writing

The following Table 3 highlights the most influential academic institutions in the field of artificial intelligence and academic writing by comparing publications (TP = Total Publications) for each institution, showing the volume of research production as an indicator of the institution’s scientific impact. The University of South Africa came in first place, with the number of publications reaching (7), then in second place, Najran University, where the number of publications reached (4), as for educational institutions such as: The Education University of Hong Kong, University College London, Beijing Normal University, American University of the Middle East, the number of publications reached (3), while the rest of the other educational institutions mentioned in the table reached the number of publications (2).

Table 3. Influential Institutions are Prominent in AI and Academic Writing.

No.	Institution	TP*	No.	Institution	TP*
1	University of South Africa	7	11	King Abdulaziz University	2
2	Najran University	4	12	Taibah University	2
3	The Education University of Hong Kong	3	13	Uniwersytet Marii Curie-Skłodowskiej w Lublinie	2
4	University College London	3	14	Multimedia University	2
5	Beijing Normal University	3	15	Georgia State University	2
6	American University of the Middle East	3	16	The University of Texas at Austin	2
7	University Sains Malaysia	2	17	University of Pittsburgh	2
8	Victoria University of Wellington	2	18	Prince Sultan University	2
9	National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute	2	19	University of Kentucky	2
10	University Teknologi MARA	2	20	University of York	2

Note: TP* = Total Publications. Source: Scopus database (2020–2024).

4.1.5. The Frequently Occurring Keywords and How the Themes Have Evolved

Figure 4 shows the relationships between keywords in academic studies related to artificial intelligence and writing, where a network of keywords related to the subject of study appears. It is clear that ChatGPT leads the situation as it forms the central axis in this map, and is surrounded by several words directly related to it, such as: Generative AI, Artificial Intelligence, Academic Integrity, Higher Education, Students, Academic Writing, Ethics, and the node colouring of the topics indicates, The green group focuses on the technical structure of ChatGPT, and the red group focuses on educational and pedagogical aspects. The blue group tends to focus on issues of educational policy and ethics, and the yellow group focuses on other tools related to artificial intelligence and writing.

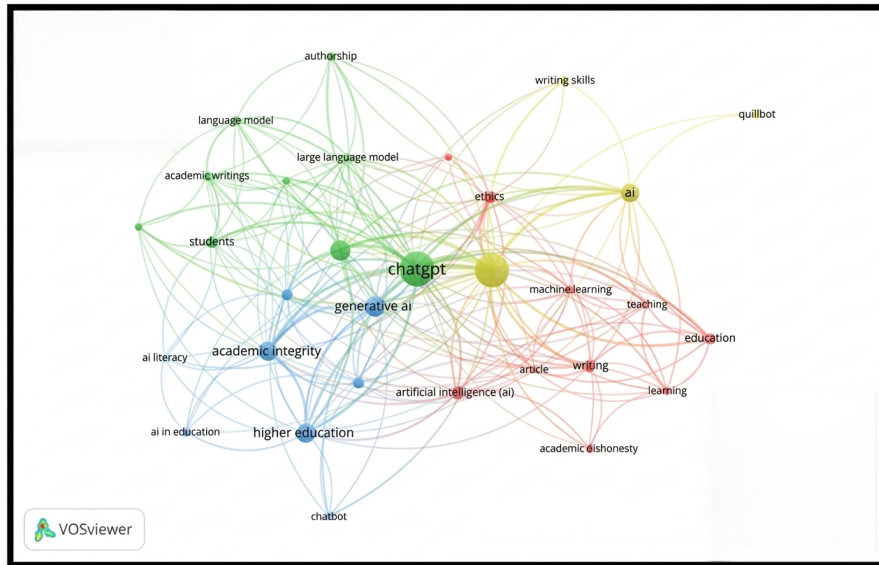


Figure 4. The frequently occurring keywords and how the themes have evolved over time.

4.2. What Are the Main Theories in the Field of Artificial Intelligence Research and Academic Writing?

The field of research that addresses the topic of using artificial intelligence tools in the field of academic writing is based on a variety of theories that reflect aspects of multiple research angles used in understanding the relationship between artificial intelligence and the development of academic writing skills in higher education environments. The most important of these theories is the “cognitive load theory.” Cognitive Load Theory (CLT) is used to understand how artificial intelligence tools such as ChatGPT affect students’ cognitive load while writing. The “Self-Regulated Learning Theory” (SRL) has also emerged to focus on learners’ ability to understand how to employ their learning using Artificial intelligence tools such as type generators.

Moreover, among the important theories are (Experimental Learning Theory), which emphasizes learning through experience, and is used to analyse the impact of using artificial intelligence tools on critical and written thinking. (Stylistics Theory) Concentrate on analyzing linguistic patterns and styles in texts produced by artificial intelligence and comparing them to human writing. The following table reviews the most important theories that have been addressed in the field of research on artificial intelligence and academic writing.

4.3. What Are the Most Common Research Instruments in the Field of Artificial Intelligence Research and Academic Writing?

Through the analysis of studies in the research field, it becomes clear that the most common statistical methods are surveys, as they are a flexible and easy-to-use tool, and qualitative tools such as content analysis and interviews. Digital tools such as screen recording were also used, and several researchers resorted to using focus groups and analyzing textual data. Some applied written performance analysis, such as stylistic analysis. Several studies have utilized innovative technological tools, such as classification models based on artificial intelligence, such as XGBoost, or automated writing assessment (AWE) tools, to measure the quality of academic texts produced.

4.4. What Is the Most Common Research Statistical Analysis in the Field of Artificial Intelligence Research and Academic Writing?

Reviewing the literature related to the field of research to find out the most important statistical analyses used and common, it becomes clear that Quantitative Analysis is the most popular method in artificial intelligence research and academic writing. Some studies have also used Mixed Descriptive Analysis and Qualitative Analysis in a significant number to delve deeper into data interpretation. In addition, Thematic Analysis studies were used to interpret qualitative data (Comparative Analysis studies), which have also been used to examine the linguistic and

stylistic differences between human texts and those resulting from artificial intelligence tools. Some studies have used specialized analyses with artificial intelligence, such as Sentence Length Analysis and XGBoost. classification, to evaluate stylistic features in addition to designing generation models. Writing and measuring its effectiveness in real-life educational environments.

Thematic Patterns Identified

Across the selected literature, three dominant themes emerged:

- (1) Pedagogical Support & Writing Enhancement**—AI assists grammar, structure, and idea development but requires guided instruction.
- (2) Ethical Tension & Academic Integrity**—Students benefit from AI writing tools yet remain vulnerable to originality, authorship, and disclosure risks.
- (3) Technological Adoption & Literacy Development**—Faculty capability and institutional governance determine the effectiveness of AI deployment.

4.5. What Are the Highlighted Research Gaps in the Field of Artificial Intelligence Research and Academic Writing?

Studies through literature review indicated that many important research gaps still need deeper exploration in the field of artificial intelligence and academic writing. The most prominent gap is the lack of research addressing the impact of artificial intelligence on academic writing and critical thinking skills. There is also an absence of studies that measure the effectiveness of artificial intelligence tools in improving the quality of academic writing in an experimental and in-depth manner. Digital tools powered by generative artificial intelligence enhance students' learning efficiency, support the development of academic writing skills, and facilitate engagement with complex writing tasks in higher education contexts [7]. There is also a clear lack of research that studies the psychological and creative dimensions associated with the use of these tools, such as their impact on students' self-motivation or their ability to express in a personal manner. It was also noted that there is a weakness in attention to the differences in cultural and institutional contexts in the use of artificial intelligence. Additionally, these topics have not received sufficient scholarly attention. Topics such as human-machine collaboration, ethical accountability of intelligent systems, and evaluating the effectiveness of machine-generated text detection tools, with sufficient analysis or scrutiny.

4.6. What Is the Future Agenda and Recommendations in the Field of Artificial Intelligence Research and Academic Writing?

The future agenda and recommendations from the literature review of studies in the field of artificial intelligence and academic writing demonstrated several key points. These include a strong call for conducting long-term studies to evaluate the sustainable impact of artificial intelligence tools such as ChatGPT on writing and critical thinking skills. There is a highlight on integrating these tools into curricula, and training teachers and students to use them effectively and with ethical responsibility. The studies also recommended the need to develop clear legal and ethical frameworks that frame the limits of scientific responsibility when using artificial intelligence tools in research studies and publishing them. They also suggested encouraging interdisciplinary research to explore the cultural and social effects of these technologies and identify differences in use and acceptance between different educational environments.

They also emphasized the importance of strengthening tools. Detect machine-generated texts and develop models capable of distinguishing between human-written texts modified using artificial intelligence, while improving their accuracy, especially considering the challenges faced by current tools like Turnitin. These recommendations of the studies also focused on the importance of enhancing personal creativity among students and not blindly relying on machine-generated texts. They advocate for evaluating the effectiveness of smart writing tools in enhancing citation and paraphrasing skills, and in the context of postgraduate studies. Moreover, they recommended the necessity of conducting studies focusing on the impact of artificial intelligence in developing research writing at the doctoral level by enhancing digital awareness (AI literacy) among academics and students alike, in a way that keeps pace with technological transformations and directs their use towards developing education, not harming

it, monitoring the ethical use of smart tools, and employing artificial intelligence as an auxiliary tool and not as a substitute for human thinking in academic writing.

5. Discussion

Interpreting the results is a crucial step for gaining a deeper understanding of how artificial intelligence tools impact academic writing. The indicators reached reflect the extent to which the relationship between the variables in the current study is clarified, particularly regarding the increasing use of artificial intelligence tools in academic writing. The use of generative AI tools has been associated with increased student motivation and engagement in academic writing contexts. ChatGPT's role as a versatile writing assistant supports opinion formation and conceptual development in digital academic writing [7]. This raises the number of uses of artificial intelligence in educational environments and scientific research. From a policy standpoint, institutions must implement AI literacy frameworks, academic integrity protocols, and pedagogical training to ensure responsible utilization. Structured digital transformation initiatives demonstrate that artificial intelligence integration is most effective when supported by formal governance mechanisms, internal control systems, and regulatory alignment frameworks that safeguard transparency and procedural integrity [18]. Forward-thinking universities are already embedding AI verification tools, plagiarism-detection enhancements, and ethical disclosure procedures to institutionalize academic rigor.

The results have been interpreted through a literature review to understand integration by examining publication years, countries, most influential authors and institutions, keywords in the field of research, theories used, statistical methods and methodologies used, research gaps, and future recommendations.

5.1. What Publishing Trends, Countries, Influential Authors, Influential Institutions, and Keywords Have Helped Clarify the Complementary Relationship between AI Tools and Academic Writing?

The timeline **Figure 2** shows publishing trends in the field of academic writing using artificial intelligence tools over the recent years. The early phase of the study period (2020–2021) reflects comparatively lower publication activity, which was followed by a steady increase in subsequent years. This pattern appears to be associated with the acceleration of generative AI development and its diffusion into academic environments. Therefore, the artificial intelligence technologies had not reached the stage of practical integration into the academic environment. Previous research has confirmed that this period was characterized by stagnation in research activity [19]. However, it began to gradually rise until it reached the highest rates of publication in 2024. The most recent year within the review window demonstrates the highest relative publication activity compared to earlier years. This temporal increase appears associated with the widespread adoption of advanced generative AI tools, such as ChatGPT and Claude, which may have contributed to researchers' interest in exploring the dimensions of using these tools and their potential impact on academic writing practices. This suggests a temporal and contextual link between the development of these tools and increased scholarly production [19]. This time discrepancy in the number of publications is explained by the extent of technological development and the speed of adoption of intelligence tools, artificial research and academic writing.

The results in **Figure 3** indicate that the United States of America is superior in terms of the volume of scientific production in this field, as it topped the ranking with more than 47 published studies. This reflects the significant progress in research and the increasing institutional interest in artificial intelligence within academic contexts, as highlighted in previous research [20]. Regarding the focus of research in this field within environments with an advanced research structure. In contrast, India and the Philippines were among the least productive countries, with only 16 studies published each, suggesting disparities that may reflect contextual differences in research infrastructure or in academic priorities related to the adoption of artificial intelligence [21]. Geographic differences may reflect relative inequalities in patterns of research engagement in the use of AI tools in academic writing, highlighting the need to enhance international collaboration and support research capacity building in less-representative contexts.

Through the results of the most prolific and influential authors in the field of academic writing and artificial intelligence **Table 2**, in first place is Kong, Siu Cheung, who obtained the highest prolific and influential author in the field. The number of publications (TP) reached: 180, and the total citations (TC): 2,684, has the highest H-index

at 28, and the highest cited paper was cited 76 times. On the other hand, if we look at the least influential ones, they are: Nazim, Mohd, Alzubi, and Ali Abbas Falah. They have a good number of publications (27 and 37, respectively), but they did not achieve the same level of citation or qualitative influence compared to the top five, while Khan, Soada Idris, and Mohammad Taj have the lowest citation in the impact index. This distinction in the size and quality of scientific contributions contributes to classifying these researchers among the most prominent authors in this field, given their deep and analytically diverse approach to the research issues at hand. These contributions would enhance existing scientific dialogue and provide reference insights that can be used to guide future research and relevant academic practices.

The results of **Table 3** indicate the most influential academic institutions in the field of artificial intelligence and academic writing by comparing publications (TP = Total Publications) for each institution, which shows the volume of research production as an indicator of the institution’s scientific influence. The University of South Africa came in first place, with the number of publications reaching 7, while the rest of the institutions varied between 4, 3, and 2 publications. It noted that there was a noticeable geographical diversity in the institutions from Asia, Europe, the United States, and the Middle East, reflecting the global character of research in the field. In addition, the marked frequency with which some institutions appear in more than one bibliometric table reflects a level of continuity in research interest in studying the relationship between artificial intelligence and academic writing, indicating the presence of specialized research trends within these institutions [22].

Figure 4 indicates that ChatGPT leads the keyword network of the study, as it forms the central axis in this map, and is surrounded by a number of words directly related to it, such as: Generative AI, Artificial Intelligence, Academic Integrity, Higher Education, Students, Academic Writing, Ethics, which reflects the major shift in academic research towards generative artificial intelligence topics. This shows how ChatGPT has become more than just a technical tool rather, it is an axis around which multiple issues intersect, such as education, writing, ethics, and academic integrity. This has been confirmed in previous research, indicating that the use of this tool has been associated with the emergence of new research pathways, as well as raising several challenges that require the development of more flexible ethical and educational frameworks capable of responding to rapid digital transformations [8].

5.2. What Are the Main Theories in the Field of Artificial Intelligence Research and Academic Writing?

The results of **Table 4** indicate the emergence of many theories that reflect understanding of the relationship between artificial intelligence and the development of academic writing skills in higher education environments, the most important of which are “Cognitive Load Theory” (CLT) and “Self-Regulating Learning Theory” (SRL), and Experiential Learning Theory and other theories, as shown in the table. This theoretical diversity points out the depth and complexity of the interaction between artificial intelligence and academic writing, as researchers seek to build a comprehensive understanding that includes cognitive, social, psychological, technical, and ethical aspects [22]. This diversity of theoretical frameworks reflects that relying on a single theory may not be sufficient to explain the complexity associated with using artificial intelligence tools in academic writing, as many studies tend to employ more than one theoretical perspective to understand the multiple and overlapping phenomena resulting from this use.

Table 4. The main theories in the field of artificial intelligence research and academic writing.

Theory	Brief Explanation
Cognitive Load Theory (CLT)	Explains how reducing cognitive effort during learning can support writing processes; applied to examine how AI tools assist writers by minimizing mental load.
Self-Regulated Learning (SRL)	Describe how learners plan, monitor, and regulate their writing activities using AI tools such as ChatGPT.
Experiential Learning Theory	Emphasizes learning through experience; used to assess how AI-supported writing fosters reflection and critical thinking.
Stylistics Theory	Focuses on the analysis of linguistic patterns and writing styles to compare AI-generated texts with human-authored writing.
Diffusion of Innovations Theory (DIT)	Explains how AI technologies are adopted in academic contexts and why adoption rates vary among users.
Constructivism	Suggests that knowledge is constructed through interaction and experience; applied to explain how AI tools support active and collaborative learning in writing.
Technology Impact Theory	Examines how technological tools, including AI, influence students’ behaviour and academic writing practices.

Table 4. Cont.

Theory	Brief Explanation
AI Literacy Development Theory	Focuses on developing ethical awareness and effective use of AI tools in academic and educational contexts.
Actor-Network Theory (ANT)	Analyses the interactions between human actors (students and educators) and AI systems in the production of academic knowledge and writing.
Feedback as a Dialogic Process Theory	Highlights the role of interactive feedback, suggesting that AI tools are most effective when used as dialogic rather than purely automated feedback providers.

5.3. What Are the Most Common Research Instruments in the Field of Artificial Intelligence Research and Academic Writing?

Through analysis of studies in the research field **Figure 5**, it becomes clear that the most common statistical methods are questionnaires. Due to their ease of use, this may be explained by the possibility of distributing such instruments electronically and their capacity to reach large research samples efficiently [22].



Figure 5. Common research instruments in the field of artificial intelligence research and academic writing.

In addition, qualitative and digital tools are used by researchers to resort to stylistic analysis. Some studies utilize innovative technological tools and various classifications based on the use of artificial intelligence tools. As mentioned earlier, the diversity of research tools employed in the included studies reflects the variety of methodological approaches used to investigate this topic, a pattern also noted in previous studies [18].

5.4. What Is the Most Common Research Statistical Analysis in the Field of Artificial Intelligence Research and Academic Writing?

Figure 6 illustrates the diversity in analysis tools and methods in studies that address the subject of artificial intelligence and its utilization in the field of academic writing. The diversity of research tools reflects the evolution of methodological approaches used to investigate this field, as many studies combine quantitative and qualitative methods to better understand the growing impact of artificial intelligence on academic writing, a pattern also highlighted in previous research [22].



Figure 6. Common research statistical analysis.

5.5. What Are the Highlighted Research Gaps in the Field of Artificial Intelligence Research and Academic Writing?

A literature review, as described in **Appendix A**, reveals significant research gaps in existing studies, particularly regarding investigating the impact of AI tools on academic writing and critical thinking skills. It is noted that there is limited research that addresses this effect through systematic experimental designs that measure the effectiveness of these tools in improving the quality of academic writing in depth. In addition, topics such as evaluating the efficiency of machine-generated text detection tools have not received sufficient analysis and scrutiny in the available literature. The literature reviews included in **Appendix A** show that research in the field of artificial intelligence and its applications in academic writing is still evolving, which calls for further scientific and experimental studies to understand its various dimensions and more accurately assess its impact on academic practices.

5.6. What Is the Future Agenda and Recommendations in the Field of Artificial Intelligence Research and Academic Writing?

The future agenda and recommendations through the literature review, see **Appendix A**, show that studies in the field of artificial intelligence and academic writing emphasize the need to expand the scope of research to include multiple dimensions, including the academic, technical, and ethical aspects associated with the use of these tools, in addition to the importance of applying them in the field within realistic educational and research contexts. Previous studies in the field of academic writing indicate that this field of research requires continuous, multidimensional measurement to evaluate the impact of the use of artificial intelligence tools, particularly on the quality of research production and academic writing practices [8]. These studies emphasize the need to treat artificial intelligence tools as auxiliary means that support human thinking, analysis, and writing, and not as alternatives to them, in a way that ensures the preservation of scientific originality and academic integrity.

6. Limitations

This review is subject to several limitations. First, the study relied exclusively on the Scopus database, which may exclude relevant studies indexed elsewhere. Second, only English-language publications were included, potentially introducing language bias. Third, no formal inter-rater reliability coefficient was calculated during screening. Fourth, 95 records could not be retrieved due to access limitations, which may introduce retrieval bias. Finally, bibliometric indicators may be influenced by database indexing practices and citation dynamics.

7. Conclusions

In summary, this systematic review underscores the accelerating role of artificial intelligence in shaping contemporary academic writing practices. Over the past five years, scholarly output in this field has grown significantly, peaking in 2024, signalling heightened global attention and institutional investment in AI-supported research environments. The United States emerged as the most active contributor, while institutions such as the University of South Africa demonstrated notable research leadership in this space.

The reviewed studies reveal a diverse methodological landscape, with scholars employing quantitative, qualitative, and mixed methods approaches. Survey instruments remained predominant, complemented by text-analysis techniques and emerging AI-driven research tools. Across the literature, ChatGPT consistently appeared as a critical keyword and focal technology, frequently analysed through theoretical lenses such as cognitive load theory and experiential learning theory.

Despite this momentum, meaningful research gaps endure. There remains limited empirical evidence on the long-term impact of AI on academic writing proficiency, critical thinking development, and research ethics. Further exploration is required to understand discipline-specific adoption patterns, student and faculty readiness, and the institutional policies needed to govern ethical and responsible use.

This review contributes to consolidating current knowledge and highlighting the strategic imperatives for higher education institutions. The findings reinforce the need for structured AI literacy programmes, transparent academic integrity frameworks, and pedagogically aligned integration strategies that position AI as an enabler — not a substitute — for scholarly thinking and creative inquiry.

Future research should prioritise longitudinal studies, cross-institutional comparisons, and evaluations of gov-

ernance models that safeguard academic rigour. Although this review is limited to Scopus-indexed and English-language studies, its insights provide a strong foundation for developing sustainable, ethical, and innovation-driven AI adoption pathways in academic writing.

Ultimately, the trajectory is clear: AI will continue to transform research and writing ecosystems. The priority now is to harness this technology responsibly, ensuring it strengthens — rather than supplants — human intellect, originality, and academic integrity.

Author Contributions

Conceptualization, A.A.R.; methodology, A.A.R. and F.A.; formal analysis, A.A.R.; investigation, A.A.R. and F.A.; data curation, A.A.R.; writing—original draft preparation, A.A.R.; writing—review and editing, F.A. and A.Y.; visualization, A.A.R.; supervision, F.A.; project administration, A.A.R. All authors have read and agreed to the published version of the manuscript.

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No new data were created in this study. The analysis is based on published articles retrieved from the Scopus database using a Systematic Literature Review (SLR) approach. All referenced articles are publicly available through the Scopus database and cited in the reference list of this manuscript.

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Conflicts of Interest

The authors declare no conflict of interest.

AI Use Statement

The researchers acknowledge that artificial intelligence (ChatGPT) tools were used supportively and limitedly to improve linguistic formulation and enhance clarity during the preparation of this study, and these tools had no role in research design, data analysis, or interpretation of results, with the authors alone bearing full responsibility for the scientific content and conclusions presented.

Appendix A

Table A1. Summary of the 32 Selected Studies on AI in Academic Writing: Theoretical Frameworks, Methodologies, and Research Gaps.

Label	Authors	Theories	Research Instruments	Statistical Analysis	Research Gaps	Future Agenda and Recommendation
A1	(Maphoto et al., 2024) [23]	SCT	e-mail interviews, focus group discussions (FGDs), and a WhatsApp group discussion.	qualitative methodology the employment of triangulation data collection methods.	Equity Issues: Access disparities (e.g., rural students, low-income groups) and digital divides.	This study contributes to rethinking academic authenticity, creativity, and the future of learning by exploring the challenges and opportunities presented by the integration of generative AI into HEIs.

Table A1. Cont.

Label	Authors	Theories	Research Instruments	Statistical Analysis	Research Gaps	Future Agenda and Recommendation
A2	(Sykes, 2024) [24]	Cognitive Load Theory (CLT).	Retrieval-Augmented Generation (RAG).	1. Performed on the readability data collected one-way measures ANOVAs using the Friedman test; 2. Qualitative metrics.	Scant research on how institutional policies or cultural differences influence outcomes.	Research should, therefore, expand these investigations across more diverse educational contexts and over longer periods to better understand the enduring impacts of AI on learning outcomes.
A3	(Melliti, 2024) [25]	Systemic Functional Linguistics (SFL).	Comparative lexical frequency analysis.	Descriptive Quantitative Analysis tracking the frequency and variations of targeted lexical items	The direct impact of these tools on MA theses writing is still not sufficiently studied.	The need to establish clear ethical guidelines and frameworks for the use of artificial intelligence (such as ChatGPT) in academic writing.
A4	(Krajka and Olszak, 2024) [26]	Constructivism; Technology-Enhanced Learning.	Classroom observations, analysis of AI-supported writing tasks, and instructional materials. A classification model based on the XGBoost algorithm. A matrix of 23 stylistic features.	Descriptive and qualitative analysis (no inferential statistics) Word frequency analysis.	Limited empirical evidence on the long-term effects of AI-assisted writing instruction.	Future studies should examine the longitudinal impacts of AI tools on academic writing development and explore diverse instructional contexts.
A5	(Desaire et al., 2024) [27]	Stylistics-based approach.	A model was trained. R programming tools for data processing and stylistic feature extraction.	XGBoost Classification Leave-One-Essay-Out Cross Validation (LOOCV) T-Test	There is a lack of studies that analyze the use of artificial intelligence in scientific writing quantitatively, not based on superficial evidence such as "phrase robotics."	The use of artificial intelligence tools in academic writing may lead to the advancement of science moving forward more quickly.
A6	(Rojas, 2024) [28]	Experiential Learning.	Surveys.	Mixed descriptive and analytical approaches.	The long-term impact of using ChatGPT on developing academic writing and thinking skills has not been measured.	Integrate the use of ChatGPT into training critical writing and scientific analysis skills, not just language editing.
A7	(Kong et al., 2024) [29]	Self-Regulated Learning - SRL	Reflective Portfolio.	Designing Writing Generator Models: Effectiveness of Interventions.	Cut to experimental studies that test the effectiveness of the proposed frameworks.	Conducting pilot studies to apply the 6-P framework in realistic educational settings.
A8	(Durak and Cankaya, 2024) [30]	Diffusion of Innovations Theory—DIT; Uses and Gratifications Theory—UGT Self-Regulated Learning; Learner-Centred Writing Theory.	Survey.	Quantitative analysis	Lack of reference to studies that evaluate ChatGPT production from a critical academic perspective.	Encourage interdisciplinary research on the impact of this technology on academic research and writing.
A9	(Olszak, 2024) [31]	Student questionnaires; reflective accounts; writing samples.	Descriptive statistics and qualitative thematic analysis.	Descriptive statistics and qualitative thematic analysis.	Limited generalizability due to a small and context-specific sample.	Further research should involve larger and more diverse learner populations and investigate disciplinary differences in AI-supported writing.
A10	(Werdiningsish et al., 2024) [32]	Structuralism.	semi-structured interviews.	Thematic analysis.	Studies are needed that include larger samples and use objective measurement tools and diverse analytical techniques.	AI developers should enhance cultural sensitivity and provide customizable feedback to align with diverse writing styles.
A11	(Sharifzadeh, 2024) [33]	Actor-Network Theory—ANT	Literary and theoretical review of concepts.	Theoretical analysis, philosophical and applied discussion	It is unclear whether large language models like ChatGPT can be considered responsible authors in academic institutions. AI-generated text detection tools are notoriously inaccurate, with the study showing that Turnitin reports are not entirely accurate and need improvement.	The need to develop legal and ethical frameworks to define and determine the role of artificial intelligence in scientific contributions, given that artificial intelligence is an aid to academic writing.
A12	(AlAfnan and MohdZuki, 2023) [34]	Stylistics theory.	Descriptive (qualitative) critical analysis.	Descriptive and comparative analytical statistics.	The study is based on a theoretical and analytical nature, and there are no conclusions based on statistics or statistical tools.	Conduct broader studies to detail stylistic differences based on different text types, and their impact on the understanding and evaluation of generated content.
A13	(Nakazawa et al., 2022) [35]	Expanding the Concept of Originality Theory.	Descriptive analytical.	Theoretical analysis, philosophical and applied discussion.	The gaps that the study sought to address include the lack of studies that focus on students' perceptions of the use of AI in academic writing.	Encourage researchers to use AI responsibly, while continuously assessing its impact on the originality and value of scientific contributions.
A14	(Rafida et al., 2024) [36]	Cresswell's Theme Analysis.	Semi-structured interviews.	Content analysis.	Lack of studies that track collaboration and oversight of the use of AI tools in higher education settings.	The use of AI tools must be regulated in a way that balances maximizing their benefits with minimizing their risks, while developing strategies to train students to use them ethically and productively.
A15	(Wang and Ren, 2024) [7]	Constructivism.	Observation, content analyses, and questionnaire.	Descriptive analysis using mean and standard deviation.	There is a significant lack of empirical studies that in-depth examine the effectiveness of AI tools in academic writing.	Integrating AI tools more fully into education curricula, while monitoring processes to ensure that creativity and innovation are encouraged and reducing uncritical reliance on content generated by tools.
A16	(G. Kurt and Y. Kurt, 2024) [37]	socio-constructivist AI Literacy.	Focus-group interviews.	Thematic Analysis.	Most existing evidence on AI-assisted writing is derived from laboratory or experimental settings rather than authentic classroom contexts.	Teachers should provide initial training and ongoing support to students in using AI effectively for feedback. Policymakers should consider the advancements in AI and their
A17	(Teng, 2023) [38]	Achievement Goal Theory.	Survey; Semi-structured interviews.	Quantitative and qualitative analysis.	Few studies examine students' motivation to use AI tools (such as QuillBot) to improve academic writing skills.	The study suggests EFL teachers use QuillBot to enhance paraphrasing skills, inspire students, and adapt teaching methods to technology, while future research is recommended to explore essay and summary writing.
A18	(Wang et al., 2024) [39]	Self-Directed Learning (SDL); Technology Acceptance perspectives.	Online survey questionnaire; follow-up interviews (mixed-methods design)	Paired t-test; univariate and multivariate regression analysis; Kruskal-Wallis' test.		Future studies should involve students from diverse academic disciplines and higher academic levels and examine AI-assisted writing in real instructional environments.
A19	(Gralha and Pimentel, 2024) [40]	Academic Integrity Framework; Technology Impact Theory.	Computational text analysis tools; AI-detection algorithms; comparative analysis of human- and AI-generated texts.	Quantitative performance evaluation metrics (e.g., detection accuracy, precision, recall); comparative statistical analysis.	Limited reliability and generalizability of existing AI-detection tools across disciplines, writing genres, and evolving generative AI models.	Development of more robust and transparent AI-detection methodologies, continuous updating of detection systems to keep pace with generative AI advancements and integrating integrity-focused policies into academic writing and publishing practices.
A20	(Gawlik-Kobylińska, 2024) [41]	Constructivism; Technology-Enhanced Collaborative Learning; Technology Impact Theory.	Student survey questionnaires; qualitative feedback and reflective responses on AI-supported collaboration.	Descriptive statistics for survey data; qualitative thematic analysis of open-ended responses.	Limited empirical research on the role of AI tools in fostering scientific collaboration and collaborative writing practices among students across disciplines.	Future research should investigate AI-supported collaboration in diverse academic disciplines and educational levels, examine its impact on collaborative academic writing outcomes, and develop pedagogical frameworks for ethical and effective AI-mediated collaboration.
A21	(Nguyen et al., 2024) [42]	Cognitive Process Theory of Writing.	Screen Recording; Pre-survey.	Quantitative Content Analysis; Hidden Markov Model—HMM.	There are shortcomings in studies that address the dynamics of human-AI collaboration in academic writing.	This study points to the need for further investigations into human-AI collaboration in learning in higher education, with implications for tailored educational strategies and solutions
A22	(Mahapatra, 2024) [43]	Feedback as a Dialogic Process Barrot.	Pre-test, post-test, delayed post-test; Focus Group Discussions (FGDs); Rubrics for Written Performance Evaluation.	Quantitative and qualitative analysis	There is little empirical evidence exploring the impact of ChatGPT as a feedback tool on academic writing skills.	Future researchers can investigate the impact of ChatGPT on various specific genres and micro-aspects of writing.

Table A1. Cont.

Label	Authors	Theories	Research Instruments	Statistical Analysis	Research Gaps	Future Agenda and Recommendation
A23	(Balachanda and Gurusamy, 2024) [44]	Experiential learning theory.	Descriptive analytical case study.	Qualitative analysis.	There is a paucity of research exploring the impact of AI tools on personal creativity and academic writing skills from a psychological and artistic perspective.	Rethinking academic assessment mechanisms to encourage critical and creative thinking, not just rapid achievement, using artificial intelligence tools.
A24	(Parker et al., 2024) [45]	(hybrid human-AI writing) theory.	Discussion board messages (self-assessment papers) (student reflections) (focus group interview) (thematic analysis).	In-depth interviews.	There is a gap in research regarding the impact of technology, especially artificial intelligence, on the development of academic writing at the doctoral level.	The need for a collaborative approach in navigating the evolving landscape of AI in doctoral education, requires AI literacy across disciplines.
A25	(Mohammad et al., 2024) [46]	Self-Perception Theory.	Survey.	Quantitative analysis.	Lack of reference to studies that address paraphrasing skills in academic writing using QuillBot	The researchers recommend QuillBot as a learning tool for mastering paraphrasing skills.
A26	(Muthukrishnan et al., 2024) [47]	AI Literacy Development Theory.	Survey.	Exploratory factor analysis; Quantitative analysis.	Previous studies have not sufficiently focused on the impact of AI awareness on responsible use in academic assignment writing.	AI literacy among prospective teachers was high and should be promoted to a higher level of responsible use of AI in education and academic writing.
A27	(Teng, 2024) [48]	Technology Impact Theory; Feedback as a Dialogic Process.	In-depth semi-structured interviews; qualitative learner reflections on AI-generated feedback.	Qualitative thematic analysis (no inferential statistical tests applied).	Limited empirical evidence on how AI-generated feedback influences learners' writing development and autonomy in authentic academic writing contexts.	Future research should examine the long-term pedagogical impact of AI-assisted feedback, explore its integration across disciplines and proficiency levels, and develop ethical guidelines for using generative AI in academic writing instruction.
A28	(Muhaemin et al., 2024) [49]	The Big Six	Survey.	Quantitative analysis.	There are no previous studies linking information skills to the use of smart text generators in the academic context.	Recommendations for future research can expand the type of population and sample coverage by involving students from various study programs to get a more comprehensive picture.
A29	(He, 2024) [50]	Self-Determination Theory - SDT	Automated Writing Evaluation - AWE	Quantitative analysis; Using multiple analyses of variance	There is a lack of studies exploring the impact of AI on students' motivation and enjoyment of writing in the context of academic education.	Future studies may investigate the connection between motivation, pleasure, academic buoyancy, and other learner-attributed variables, as well as other fundamental abilities.
A30	(Sword et al., 2024) [51]	Academic Writing Theory.	Survey.	Quantitative analysis.	Lack of sufficient attention to the social and emotional aspects of academic writing, and excessive emphasis on behavioural habits.	The study recommends further research into how to improve academic writing by focusing on writers' personal emotions and experiences, as well as the development of new teaching tools.
A31	(Kramar et al., 2024) [52]	Writing for Academic Purposes EAP Automated Writing Evaluation AWE.	Survey.	Quantitative and qualitative analysis.	There is a dearth of research exploring the use of tools like ChatGPT, Grammarly, and QuillBot within language teaching for academic purposes (EAP) contexts.	Conduct qualitative studies using semi-structured interviews to gain a deeper understanding of students' attitudes and values.
A32	(Santiago et al., 2023) [53]	Technology Acceptance Perspectives; Technology Impact Theory.	Corpus of academic research texts; text mining and computational linguistic tools; document analysis.	Text mining techniques; frequency analysis; pattern extraction and descriptive computational analysis.	Limited understanding of how writing assistance tools are utilized in authentic research writing contexts within higher education, particularly in developing-country settings.	Future research should expand text-mining analyses to larger and more diverse academic corpora, compare disciplinary differences in AI-assisted writing practices, and examine the pedagogical and ethical implications of writing assistance tools in research contexts.

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