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Submission date: 26-Oct-2026 11:03AM (UTC+0700)
Submission ID: 3070797166
File name: 839_ijopate.docx (2.73M)
Word count: 13011
Character count: 86572

OPEN ACCESS

Indonesian Journal of Pedagogy and Teacher Education Vol 4 No 3 (2026) https://doi.org/10.58723/ijopate.v4i3.839

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Research Article

Beyond Efficiency: A Systematic Review of Human–AI Interaction in Academic Writing in Higher Education

Received: July 29, 2026 | Revised: September 18, 2026 | Accepted: October 12, 2026 | Published: October 27, 2026

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Abstract:

Background: Generative artificial intelligence (AI) is increasingly integrated into higher education, reshaping academic writing practices and student interaction with digital tools. However, the nature of human–AI interaction in academic writing and its implications for learning remain insufficiently synthesized.

Aims: This study systematically reviews AI-assisted academic writing in higher education, focusing on its cognitive, pedagogical, and ethical dimensions. It also develops a context-mediated framework explaining how pedagogical and institutional factors shape educational outcomes.

Methods: A systematic review with qualitative thematic synthesis examined studies published from 2023 to 2025. Searches of Web of Science, Scopus, ERIC, PsycINFO, and PubMed were conducted in January 2026. Following predefined eligibility criteria and structured screening, 20 studies were included.

Results: AI tools can support academic writing through improved linguistic accuracy, more efficient drafting and revision, and greater learner confidence. However, potential risks include reduced cognitive engagement, over-reliance on AI-generated content, and academic integrity concerns. Outcomes appear to depend not on the technology alone but on patterns of human–AI interaction within pedagogical and institutional contexts.

Conclusion: The review proposes a context-mediated framework in which pedagogical guidance, student engagement, and institutional policy conditions the educational impact of AI-assisted writing. AI is therefore best understood as a contingent educational tool whose value depends on how responsibly it is integrated into higher education.

Keywords: Academic Writing, Higher Education, Human–AI Interaction, Systematic Review

1. INTRODUCTION

Artificial intelligence (AI) has rapidly shifted from a specialised technological domain into an everyday component of academic practice (Chen & Gong, 2025; Isaee & Barjesteh, 2026; Manoochehrzadeh et al., 2025; Risdianto et al., 2025). In higher education, this transformation is most visible in academic writing, where generative AI tools are increasingly used to support idea development, drafting, editing, and refinement processes (Deep & Chen, 2025). What was once a peripheral form of assistance has now become an embedded feature of students' writing experiences, reshaping how written academic work is produced and revised (Barrillo, 2024; Isaee, 2026b; L. Wang & Ren, 2024). Academic writing, however, is not merely a technical skill. It represents a core intellectual activity in higher education through which learners construct meaning, develop arguments, and engage with disciplinary knowledge. Effective writing requires more than linguistic accuracy; it involves critical thinking, synthesis of ideas, and the ability to articulate original perspectives within academic conventions (Dwivedi et al., 2023). The increasing presence of AI in this process therefore raises important questions about how technological support interacts with cognitive development and independent authorship.

From a functional perspective, AI-assisted writing tools are often valued for their capacity to reduce linguistic barriers and support text production (Barjesteh et al., 2026). Studies suggest that such tools can enhance vocabulary use, improve grammatical accuracy, and facilitate smoother organization of ideas, particularly for learners working in a second language (Barjesteh & Isaee, 2024; Zahid et al., 2024). By offering immediate feedback and automated suggestions, AI systems may reduce the cognitive burden associated with surface-level writing tasks, allowing students to allocate more attention to content development.

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At the same time, the growing integration of these tools has generated critical debate. Concerns have been raised that frequent or uncritical use of AI may weaken students' engagement in higher-order cognitive processes such as analysis, evaluation, and argument construction (Chalkiadakis et al., 2024; Dhanapal et al., 2024). In addition, the boundaries between human authorship and machine-generated text are becoming increasingly blurred, raising new questions about originality, responsibility, and academic integrity.

Rather than treating these developments as purely beneficial or problematic, recent scholarship has begun to examine AI-assisted writing as a complex interaction between learners and technology. Empirical and conceptual studies have explored students' perceptions, instructional applications, and ethical concerns related to AI use in writing contexts (Anani et al., 2025; Dahlen et al., 2024; Dhanapal et al., 2024; Dwivedi et al., 2023; Fiorillo, 2024). However, despite this growing body of work, findings remain scattered across different contexts and methodological approaches, limiting a coherent understanding of how AI actually shapes academic writing processes in higher education.

This study addresses this gap by systematically reviewing existing research on *AI-assisted academic writing in higher education*, with particular attention to cognitive, pedagogical, and ethical dimensions. Unlike studies that focus narrowly on performance outcomes, this review conceptualizes AI-assisted writing as a form of human–technology interaction shaped by instructional context and institutional conditions. Accordingly, this review addresses the following research questions:

RQ1: What cognitive, pedagogical, and ethical benefits of AI-assisted academic writing are reported in higher education research?

RQ2: What challenges and risks emerge from students' use of AI writing tools in academic contexts?

RQ3: How do pedagogical and institutional conditions shape the outcomes of AI-assisted writing practices?

By addressing these questions, the review tries to provide a more integrated understanding of how generative AI influences academic writing as a situated educational practice. It also seeks to move beyond simplistic benefit–risk dichotomies by highlighting the contextual and interactive nature of AI use in higher education writing environments. This review contributes a context-mediated interpretation of AI-assisted writing outcomes, emphasizing the role of pedagogical and institutional conditions in shaping human–AI interaction.

The emergence of "AI-Assisted Academic Writing in Higher Education".

Research on AI has expanded rapidly over the past decade, especially in the field of education, with academic writing emerging as one of the most prominent application areas. Early studies focused primarily on automated feedback and grammar correction systems, while more recent work has examined generative AI tools capable of producing extended text, suggesting revisions, and supporting content development (Mohd Amin et al., 2025; Nazari et al., 2021; Pellas, 2025). This shift has significantly altered how AI is conceptualized within academic writing processes.

In higher education contexts, AI-assisted writing tools are now commonly used during multiple phases of writing, including idea generation, drafting, revision, and editing (Isaee et al., 2026). Rather than functioning as isolated support mechanisms, these tools increasingly operate as integrated writing companions that influence how students plan, structure, and refine academic texts (Harajpoor et al., 2026). As a result, scholarly attention has moved beyond technical performance to broader educational implications.

Pedagogical Benefits of AI-Supported Writing Tools

A substantial portion of the literature highlights the potential pedagogical benefits associated with AI-assisted academic writing. Many studies report improvements in linguistic accuracy, sentence clarity, and overall writing efficiency when students use AI tools as part of the drafting and revision process (Gasaymeh et al., 2024; Kim et al., 2025). These benefits are particularly salient for students writing in a second or foreign language, who often face additional challenges related to vocabulary selection and syntactic complexity.

Beyond surface-level language support, some researchers argue that AI tools can contribute to higher-level writing processes when used strategically. For example, AI-generated suggestions related to organization and coherence may help students structure arguments more effectively and maintain logical flow across sections of a text (Marzuki et al., 2023; C. Wang, 2025). In these cases, AI functions less as a content producer and more as a cognitive scaffold that supports students' decision-making during writing. Several studies also report positive affective outcomes. Increased confidence, reduced writing anxiety, and greater willingness to engage in revision have been observed among students who perceive AI tools as supportive rather than evaluative (Chen & Gong, 2025). These findings suggest that AI-assisted writing may indirectly support learning by lowering affective barriers that often hinder academic writing development.

Risks of Over-Reliance and Cognitive Disengagement

Despite these reported benefits, the literature consistently warns against uncritical or excessive reliance on AI writing tools. A recurring concern is that frequent dependence on AI-generated content might weaken students' engagement in critical thinking,

analysis, and independent reasoning (Zhai et al., 2024). When AI outputs are accepted without evaluation, students may bypass essential cognitive processes involved in argument construction and evidence-based reasoning.

Empirical studies have documented cases in which AI-assisted writing led to superficial engagement with content, particularly when students prioritised efficiency over understanding (Chalkiadakis et al., 2024). In such contexts, AI tools risk becoming substitutes for intellectual effort rather than supports for learning. This concern is especially pronounced in disciplines that emphasize argumentation, interpretation, and original contribution. Researchers also note that AI-generated text can introduce inaccuracies, bias, or fabricated information, requiring users to possess sufficient disciplinary knowledge to evaluate outputs critically (Fiorillo, 2024) Without explicit instructional guidance, students may struggle to distinguish reliable AI assistance from misleading or inappropriate suggestions.

Academic Integrity and Ethical Considerations

Academic integrity represents one of the most prominent themes in the literature on AI-assisted academic writing. Traditional definitions of plagiarism and authorship were developed in contexts that did not anticipate machine-generated text, leading to ongoing ambiguity regarding acceptable AI use (Artyukhov et al., 2024). As a result, institutions and educators face challenges in establishing clear and enforceable guidelines.

Several studies highlight concerns related to unattributed AI-generated content, blurred authorship boundaries, and inconsistencies in citation practices when AI tools are involved in text production (Isaee, 2026a, 2026b; McIntire et al., 2024; Schei et al., 2024). These issues complicate conventional approaches to academic honesty and raise questions about how responsibility and originality should be defined in AI-supported writing contexts.

Simultaneously, scholars caution against framing AI solely as a threat to integrity. Some argue that ethical risks are closely tied to pedagogical design rather than the technology itself (Fiorillo, 2024). From this perspective, transparent policies, explicit instruction, and ethical literacy are essential for mitigating misuse and supporting responsible engagement with AI tools.

The Role of Pedagogical Guidance and Institutional Policy

Across the reviewed literature, there is broad agreement that the educational impact of AI-assisted writing depends heavily on instructional context. Studies consistently emphasize the importance of guided use, where educators explicitly frame AI as a support tool rather than a content authority (Deep & Chen, 2025). Under such conditions, students seem to be more likely to engage critically with AI output and maintain ownership of their writing.

Institutional policies also play a crucial role. Clear definitions of acceptable AI use, alignment between assessment design and learning objectives, and consistent communication of ethical expectations have been identified as key factors in reducing misuse (Ruiz-Rojas et al., 2024). Without institutional coherence, students may receive conflicting messages regarding AI legitimacy and responsibility.

Taken together, the literature suggests that AI-assisted academic writing cannot be evaluated in isolation from pedagogical and institutional frameworks. Its benefits and risks are shaped by how tools are introduced, monitored, and embedded within broader educational practices.

2. MATERIALS AND METHODS

2.1 Research Design

This study employed a systematic review design with qualitative thematic synthesis to examine research on human–AI interaction in academic writing in higher education. A systematic review design was selected because it provides a structured approach for identifying, screening, evaluating, and synthesizing relevant literature according to predefined eligibility criteria. Given the methodological and contextual diversity of the included studies, the findings were synthesized qualitatively rather than through statistical meta-analysis.

The review therefore focused on identifying patterns, convergences, divergences, and contextual differences across the included literature. The synthesis considered the cognitive, pedagogical, interactional, and ethical dimensions of human–AI interaction in academic writing. Rather than estimating a pooled effect, the analysis compared findings across studies and interpreted them in relation to the research questions. The search, screening, eligibility, and inclusion procedures are reported transparently in accordance with the principles of PRISMA 2020 (Page et al., 2021).

To strengthen methodological transparency and reproducibility, the review process was structured around explicit stages of identification, screening, eligibility assessment, and inclusion. The reporting of the search and study-selection process was aligned with the principles of the PRISMA 2020 statement, including documentation of the information sources, search period, record management, screening process, full-text eligibility assessment, and final study inclusion. The review was designed to synthesize evidence qualitatively rather than to calculate pooled statistical effect sizes.

2.2 Search Strategy

A comprehensive literature search was conducted across five electronic databases: Web of Science, Scopus, ERIC, PsycINFO, and PubMed. The searches were conducted in January 2026 and were restricted to publications appearing between January 2023 and December 2025. This publication window was selected

to capture the rapid development and increasing academic use of generative artificial intelligence and AI-assisted writing technologies while maintaining a clearly defined and reproducible search period.

The search strategy combined four main conceptual domains: artificial intelligence and generative artificial intelligence; academic or scholarly writing; higher education; and AI-supported or AI-assisted writing. Core search terms included variations of "artificial intelligence," "generative artificial intelligence," "generative AI," "GenAI," "ChatGPT," "large language model," "AI-assisted writing," "AI-supported writing," "academic writing," "academic literacy," "scholarly writing," "writing instruction," "higher education," "university," "college," and "tertiary education." Boolean operators AND and OR were used to combine the concepts. Truncation and database-specific syntax were adapted where supported by the individual databases.

The core search structure was conceptually represented as follows:

("artificial intelligence" OR "generative artificial intelligence" OR "generative AI" OR GenAI OR ChatGPT OR "large language model" OR "AI-assisted" OR "AI-supported") AND ("academic writing" OR "scholarly writing" OR "academic literacy" OR "writing instruction") AND ("higher education" OR universit OR college OR "tertiary education").

Because the five databases use different indexing systems and search interfaces, the core search structure was adapted to the syntax and field-search functions of each database. Searches were limited to English-language publications published between 2023 and 2025 and were restricted to sources meeting the eligibility criteria described in Section 2.3.

The initial database searches yielded 1,348 records: Web of Science (n = 286), Scopus (n = 412), ERIC (n = 214), PsycINFO (n = 241), and PubMed (n = 195). After removal of 312 duplicate records, 1,036 unique records remained for title and abstract screening. In addition to database searching, backward citation searching was conducted by examining the reference lists of potentially relevant and included studies. Citation searching was used as a supplementary identification strategy rather than as a substitute for the database search.

The search process was designed to maximize coverage while maintaining a clearly bounded publication period and explicit eligibility criteria. The complete search and screening process is summarized in the PRISMA-style flow diagram presented in Figure 1.

2.3 Inclusion and Exclusion Criteria

Studies were considered eligible when they examined the use of artificial intelligence, generative AI, or AI-enabled writing technologies in relation to academic writing practices within higher education. Eligible studies needed to address at least one substantive aspect of academic writing, such as idea generation, drafting, revision, language refinement, argument development, academic authorship, citation practices, writing-related learning, or the evaluation of AI-generated academic text. Studies situated in higher education but focused exclusively on general teaching and learning, intelligent tutoring, general e-learning, workplace learning, or language instruction without a substantive academic-writing component were not considered directly relevant to the core review questions.

Peer-reviewed review articles and scholarly conceptual or commentary publications were eligible when they directly addressed AI-assisted academic writing in higher education and provided substantive analytical relevance to the research questions. Non-peer-reviewed opinion pieces, informal commentaries, editorials without substantive analysis, and other non-scholarly materials were excluded. Because the evidence base included multiple publication types, source type and methodological design were explicitly recorded and considered during quality appraisal and synthesis.

2.4 Study Selection Process

Study selection proceeded through sequential identification, duplicate removal, title and abstract screening, full-text assessment, and final inclusion. The database searches identified 1,348 records. Following automated and manual checking of bibliographic information, 312 duplicate records were removed, leaving 1,036 unique records for title and abstract screening.

During title and abstract screening, 886 records were excluded because they did not address AI-assisted or generative-AI-supported academic writing, did not concern higher education, did not provide sufficient relevance to the research questions, or fell outside the predefined publication and language criteria. 150 reports were therefore retained for full-text assessment.

Full texts were assessed against the predefined eligibility criteria. 130 reports were excluded at this stage. The principal reasons for exclusion were insufficient focus on academic writing (43 reports), a population or educational context outside higher education (31 reports), insufficient empirical or analytical relevance to the research questions (27 reports), and failure to meet the publication, language, or methodological eligibility requirements (29 reports). After full-text assessment, 20 studies met all inclusion criteria and constituted the final review corpus.

Backward citation searching was also conducted on the reference lists of relevant studies. Records identified through citation searching were screened using the same eligibility criteria. Citation searching did not result in additional studies being added to the final corpus beyond those already identified through the principal database search. The final corpus therefore comprised 20 studies published between 2023 and 2025. The

characteristics of these studies, including their methodological approaches, contexts, participants or data sources, and principal findings, are presented in Table 3. The complete study-selection process is summarized in the PRISMA-style flow diagram presented in Figure 1.

2.5 Data Extraction and Synthesis

Data extraction and synthesis were conducted using a structured framework aligned with the three research questions. The purpose of the synthesis was not to estimate a pooled numerical effect of AI-assisted academic writing, but to integrate findings reported across studies with different methodological designs, outcome measures, populations, and educational contexts. This approach was considered appropriate because the research questions focused on identifying reported benefits and challenges and examining how pedagogical and institutional conditions shape the outcomes of AI-assisted writing practices.

For each included study, relevant information was systematically extracted, including the study's research focus, publication year, geographical and educational context, methodological design, participant characteristics or data sources, AI technology or writing application examined, principal outcomes, reported benefits and risks, and contextual or pedagogical conditions identified by the authors. Where quantitative studies reported numerical findings, these findings were retained as reported in the original studies and considered during the interpretation of the evidence; however, they were not statistically pooled because the studies differed substantially in designs, measures, samples, and outcome definitions.

The synthesis followed a qualitative thematic approach. Extracted findings were first compared within and across studies to identify recurring patterns and areas of convergence and divergence. Findings were then organized according to the substantive issues addressed by the research questions. Three overarching analytical dimensions were initially used to structure the synthesis: cognitive outcomes, pedagogical implications, and ethical considerations. During the comparative analysis, these dimensions were further refined to capture recurring issues concerning writing performance and efficiency, cognitive engagement, human–AI interaction, instructional guidance, institutional conditions, academic integrity, and risks of over-reliance.

The thematic categories were developed iteratively rather than imposed exclusively in advance. Relevant findings were compared across the included studies, and categories were refined when studies presented overlapping, contrasting, or context-dependent findings. This process enabled the synthesis to preserve important differences among studies while identifying broader patterns across the evidence base. The resulting themes were subsequently mapped onto the three research questions and used to organize the presentation and interpretation of findings in the Results and Discussion sections.

Accordingly, the review did not treat qualitative synthesis as a substitute for quantitative evidence. Instead, quantitative, qualitative, and mixed-methods findings were incorporated into a common evidence-synthesis framework, while their methodological differences were explicitly considered during interpretation. Because the purpose of the review was to understand the range and context of reported human–AI interaction outcomes rather than to calculate a common effect size, a qualitative thematic synthesis was considered more appropriate than statistical meta-analysis for the present evidence base.

2.6 Quality Considerations

Because the final evidence base comprised studies using different methodological approaches, quality appraisal was conducted with attention to study design rather than through a single undifferentiated scoring system. Empirical quantitative, qualitative, and mixed-methods studies were assessed according to the clarity of their research objectives, appropriateness of research design, adequacy of sampling or data sources, transparency of data collection and analysis, and coherence between the reported evidence and the conclusions. Review-based studies were assessed with additional attention to the transparency of their search or evidence-selection procedures, synthesis approach, and methodological reporting. Conceptual and commentary publications were considered primarily for the clarity of their argumentation, relevance to the review questions, transparency in the use of supporting evidence, and contribution to the interpretation of ethical, pedagogical, or policy issues.

The appraisal was used to inform the interpretation of the evidence rather than as a mechanical basis for assigning a single numerical quality score. Studies with stronger methodological reporting were given greater interpretive weight when their findings were used to support substantive conclusions, whereas findings from methodologically limited or non-empirical sources were treated more cautiously. No study was excluded solely because of a lower appraisal profile, as the purpose of the synthesis was to capture the range of evidence available in this rapidly developing field while making differences in evidential strength explicit.

Particular care was taken to distinguish primary empirical evidence from secondary and conceptual sources. Review studies were not treated as independent replications of the primary studies on which they might have drawn. When a finding was supported both by a review publication and by primary research, the primary empirical evidence was given precedence in interpreting evidence about outcomes, while review and commentary sources were used mainly to contextualise, compare, or interpret broader pedagogical and ethical issues. This approach was adopted to reduce the risk of double counting the same underlying evidence across different publication types.

The methodological diversity of the corpus is therefore treated as an analytical feature and a limitation of the evidence base. Rather than combining all studies as

though they provided equivalent forms of evidence, the qualitative thematic synthesis considered differences in design, evidential strength, scope, and source type when identifying patterns across the literature.

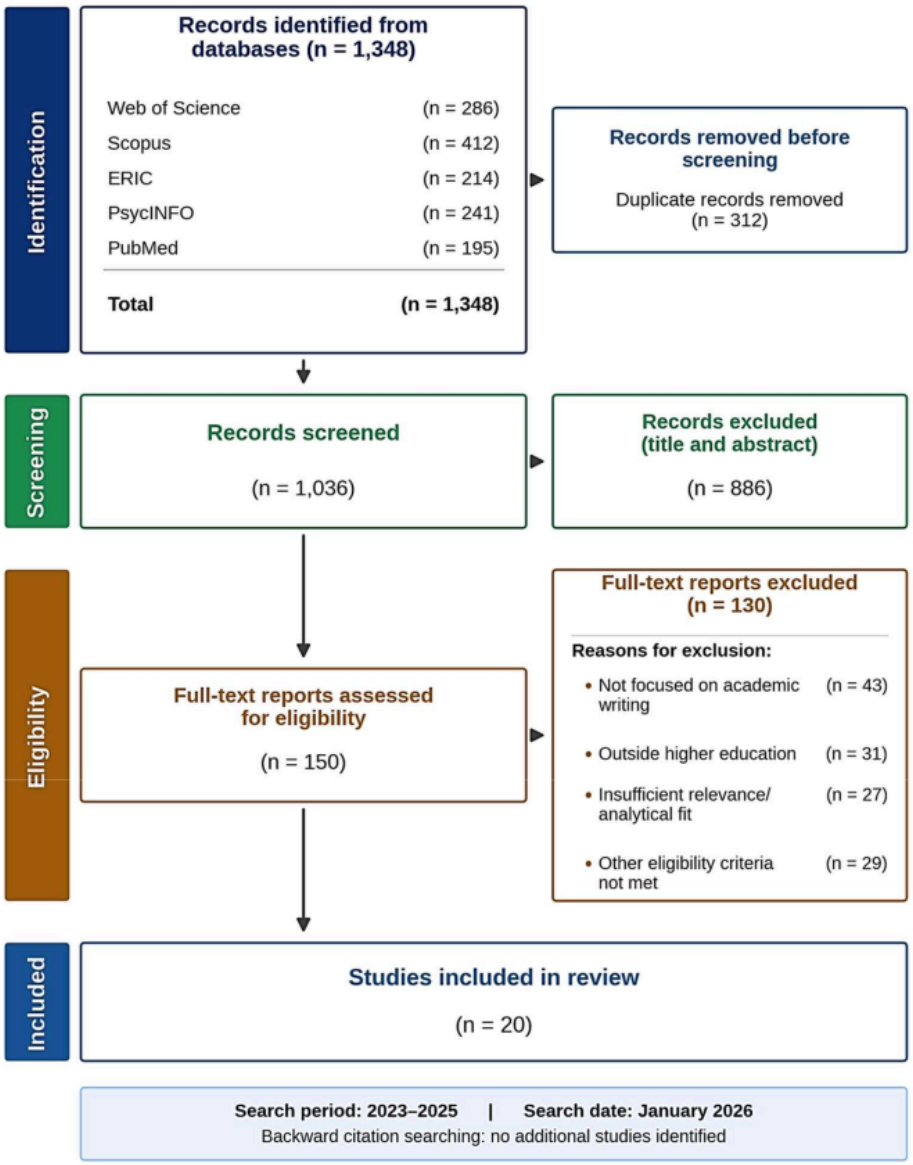


Figure 1. PRISMA-style flow diagram

3. RESULTS AND DISCUSSION

3.1 Results

The database searches conducted in January 2026 identified 1,348 records published between 2023 and 2025. After removal of 312 duplicate records, 1,036 unique records were screened by title and abstract. Of these, 886 records were excluded because they did not satisfy the relevance and eligibility criteria. Full-text assessment was subsequently conducted for 150 reports, of which 130 were excluded for reasons documented in the study-selection process. Twenty studies ultimately met the eligibility criteria and were included in the review. The complete identification, screening, eligibility, and inclusion process is presented in Figure 1.

3.1.1 Overview of Synthesized Findings

The synthesis of findings from the reviewed studies is organized thematically in accordance with the research questions and is supported by summary tables that consolidate key patterns across the literature. Rather than treating the included studies as isolated contributions, the analysis focuses on identifying

recurring tendencies, conceptual overlaps, and areas of divergence in relation to AI-assisted academic writing in higher education.

Across the reviewed literature, four dominant and interrelated dimensions emerged: writing performance and efficiency, cognitive and affective engagement, risks associated with over-reliance on AI tools, and issues related to academic integrity. These dimensions provide the structural basis for the presentation and interpretation of findings in the subsequent sections.

In interpreting these dimensions, evidence from primary empirical studies was distinguished from findings reported in review and commentary publications, so that secondary sources were not treated as independent confirmations of the same underlying evidence.

Table 1. General Characteristics of the Reviewed Studies

Study Range	Geographic Scope	Population / Data Source	Research Design	Primary Research Focus
S1–S20	Multiple regions (single-country and cross-country)	University students and academic publications	Quantitative, qualitative, mixed methods, review, commentary	AI-supported academic writing, learning outcomes, and ethics

The diversity of contexts and methodologies strengthens the analytical breadth of the review and allows for a comprehensive synthesis of findings related to AI use in academic writing.

3.1.2 Enhancements in Writing Accuracy and Efficiency

Writing accuracy and efficiency emerged as important outcomes in the reviewed literature, although the strength and nature of these outcomes varied across studies. Several studies directly examining AI-assisted academic writing reported improvements in language refinement, organization, drafting, or revision. For example, Marzuki et al. (2023) reported perceived improvements in the content and organization of student writing, while L. Wang and Ren (2024) found that students used generative AI to support idea organization and writing efficiency. Kim et al. (2025) similarly reported that students perceived AI as useful for organizing academic writing and improving efficiency. More direct intervention evidence was provided by Mahapatra (2024), whose study examined the effect of ChatGPT on ESL students' academic writing skills. Anani et al. (2025) likewise examined the use of AI for academic writing among university students and reported perceived benefits for writing quality.

The reviewed evidence therefore suggests that AI-assisted writing can provide useful support at several stages of the writing process. The most commonly identified functions concerned language refinement, organization, drafting, and revision rather than complete replacement of the student writing process. These findings indicate that AI may be particularly useful when it is employed to identify linguistic problems, suggest alternative formulations, or provide feedback that students subsequently evaluate and revise.

Writing efficiency was also reported in several studies. Kim et al. (2025), Mahapatra (2024), and C. Wang (2025) examined forms of AI-supported writing activity in higher education and identified efficiency-related advantages, including assistance with drafting, revision, or the management of writing processes. Such findings suggest that generative AI can reduce some of the procedural effort associated with academic writing. However, procedural efficiency should not be interpreted as evidence of improved learning in itself. Faster production of text does not necessarily indicate deeper understanding, stronger argumentation, or greater writing competence.

The evidence also indicates that improvements in surface-level writing quality should be distinguished from broader academic writing development. AI tools can assist with sentence formulation, lexical choice, organization, and revision, but the educational significance of these functions depends on whether students remain responsible for evaluating suggestions and making final decisions. Accordingly, the synthesis supports a distinction between writing assistance and independent writing development. AI-supported improvement is most defensible when the technology supplements rather than replaces students' intellectual and authorial work.

Overall, the evidence synthesized in Table 2 indicates that AI-assisted writing tools contribute to improved linguistic performance and procedural efficiency when they are used as supportive instruments rather than replacements for independent writing effort.

Table 2. Reported Educational Benefits of AI-Supported Academic Writing

Benefit Category	Description of Reported Outcomes	Representative Studies
Linguistic accuracy	Assistance with grammar, wording, lexical choice, sentence refinement, and textual clarity	S4, S16, S17, S19
Writing organization	Support for structuring ideas, organizing content, and improving textual coherence	S4, S5, S10, S19
Writing efficiency	Assistance with drafting, revision, and completion of writing-related tasks	S5, S10, S16, S17, S19

Benefit Category	Description of Reported Outcomes	Representative Studies
Feedback and revision support	Immediate suggestions that can support iterative drafting and revision	S5, S16, S19
Learner confidence	Greater confidence or reduced difficulty associated with producing academic texts	S17, S19
Writing autonomy	Opportunities for students to revise, refine, and monitor their own writing with AI-supported feedback	S16, S19

Note. S = study identifier

Overall, the findings indicate that AI writing tools can positively contribute to academic writing development when used as supplementary aids rather than replacements for student effort.

3.1.3 Cognitive and Affective Engagement

The evidence concerning cognitive and affective engagement was more heterogeneous than the evidence concerning writing assistance. Some studies reported that AI-supported writing provided useful scaffolding for idea development, organization, or confidence, whereas others raised concerns about reduced cognitive involvement when AI-generated material was accepted without sufficient evaluation.

Positive engagement was evident in studies in which AI was used as part of an interactive writing process. L. Wang and Ren (2024), for example, examined students' use of generative AI in collaborative academic writing and reported benefits related to organization and writing efficiency, while also identifying concerns about reduced critical engagement. Kim et al. (2025) found that students viewed generative AI as a multifunctional writing assistant that could support organization and efficiency. Mahapatra (2024) also examined the use of ChatGPT as part of an academic writing intervention, providing evidence that AI-supported writing can be integrated into instructional activities rather than used solely as an autonomous text-production mechanism.

At the same time, several studies identified potential cognitive risks. Schei et al. (2024) reported concerns regarding the reliability of AI chatbots and their possible effects on critical and creative thinking. Zhai et al. (2024) specifically examined over-reliance on AI dialogue systems and identified concerns related to analytical reasoning, decision-making, and critical thinking. Kim et al. (2025) and C. Wang (2025) also documented tensions between the convenience offered by generative AI and the possibility that some aspects of students' learning and writing processes may be displaced.

The evidence therefore does not support a simple conclusion that AI either improves or reduces cognitive engagement. Instead, the reviewed studies suggest that cognitive outcomes depend partly on how students use AI-generated material. Interactive use involving evaluation, comparison, revision, and justification appears more compatible with continued learner engagement than uncritical acceptance of machine-generated text. This interpretation is consistent with the broader pattern identified across the corpus: AI functions more productively as a support mechanism when students retain responsibility for evaluating and transforming its output.

Affective outcomes should also be interpreted cautiously. Evidence concerning confidence and reduced difficulty was present in some studies, particularly those involving student perceptions of AI-supported writing, but affective variables were not examined systematically across the entire corpus. The available evidence therefore suggests potential affective benefits rather than a universal reduction in anxiety or a uniform increase in confidence.

Overall, the evidence presented in Table 3 indicates that AI-assisted writing tools simultaneously support affective engagement while posing conditional risks to cognitive depth. The balance between these two outcomes appears to depend strongly on how actively learners are involved in the evaluation and refinement of AI-generated input.

Table 3. Summary of Studies Examining AI-Assisted Academic Writing in Higher Education

Study No.	Citation	Region	Population / Data Source	Purpose of the Study	Method	Key Findings
S1	Gasaymeh et al., 2024	Jordan	University students	To investigate students' awareness of generative AI writing tools, perceived advantages, and concerns related to their academic use.	Quan	Students demonstrated moderate familiarity with AI tools, acknowledged their benefits, and expressed concerns about misinformation, privacy, and data security.

Study No.	Citation	Region	Population / Data Source	Purpose of the Study	Method	Key Findings
S2	Schei et al., 2024	Norway	University students	To review empirical studies examining learners' perspectives and applications of AI chatbots in higher education.	R.	AI chatbots were viewed as useful for learning support and task completion; however, concerns were raised regarding reliability, accuracy, and possible negative effects on critical and creative thinking.
S3	Dwivedi et al., 2023	Cross-country	Academic literature	To explore opportunities, limitations, and implications of generative AI (ChatGPT) across research, practice, and policy domains.	C.	Generative AI presents substantial opportunities across sectors while also generating ethical, legal, and practical debates.
S4	Marzuki et al., 2023	Indonesia	University students	To examine EFL teachers' perceptions of how AI writing tools influence students' written content and organization.	Qual.	AI tools were reported to enhance writing quality, particularly content and structure, though concerns regarding over-dependence were noted.
S5	Wang & Ren, 2024	Hong Kong	Academic students	To analyse students' use of generative AI tools in collaborative digital academic writing tasks.	M.M	Students effectively used AI to organize ideas and improve writing efficiency, while expressing ethical concerns related to plagiarism and reduced critical engagement.
S6	Khalifa & Albadawy, 2024	Cross-country	University studies	To review the role of AI in enhancing research and academic writing across disciplines.	R.	AI was found to support literature synthesis, idea generation, editing, and publishing, with ethical considerations remaining essential.
S7	Zhai et al., 2024	Cross-country	Academic studies	To investigate factors contributing to over-reliance on AI dialogue systems and their effects on learners' cognitive abilities.	R.	Excessive dependence on AI weakened analytical reasoning, decision-making, and critical thinking, while raising concerns about bias and hallucinated content.
S8	Fiorillo, 2024	Cross-country	Content analysis	To reassess the role of AI writing tools in maintaining scientific integrity.	C.	AI tools can enhance clarity and efficiency in scholarly writing, but need ethical oversight to prevent misinformation and bias.
S9	Gawlik-Kobylińska, 2024	Poland	University students	To explore learners' perceptions of integrating AI into academic collaboration, including writing and poster creation.	Qual.	AI-supported efficiency and idea generation in collaborative tasks, though concerns were raised about technical challenges, ethical issues, and reliance.
S10	Kim et al., 2025	China	University students	To examine students' experiences and perceptions of AI-assisted academic writing.	Qual.	Students viewed AI as a multifunctional assistant that improved organization and efficiency, while expressing concerns about accuracy, bias, and ethical use.
S11	Artyukhov et al., 2024	Cross-country	Academic publications	To analyse the relationship between AI, academic integrity, and Sustainable	Qual.	AI was identified as both an opportunity for personalised learning and a challenge to academic integrity due to

Study No.	Citation	Region	Population / Data Source	Purpose of the Study	Method	Key Findings
				Development Goal 4 in education.		potential misuse of AI-generated content.
S12	Li et al., 2024	Cross-country	Scoping review	To map the ethical challenges associated with ChatGPT use in higher education through a scoping review of English-, Chinese-, and Japanese-language literature.	R.	Ethical concerns cluster around misinformation, academic integrity and assessment, authorship in academic publishing, and data protection; most published work is discussion-based rather than empirical.
S13	McIntire et al., 2024	North America	Content analysis	To reconceptualize academic integrity by shifting the discussion from moral ethics to pragmatic considerations of plagiarism and cheating.	Qual.	Academic dishonesty is framed as a pragmatic decision; institutions should emphasize its negative impact on learning outcomes rather than focusing solely on ethical violations.
S14	Risdianto et al., 2025	Iran	University students	To evaluate whether educational interventions reduce plagiarism and to identify factors influencing dishonest academic behavior.	Quan.	Instructional efforts help decrease plagiarism, but education alone is insufficient; stronger institutional policies and monitoring mechanisms are required.
S15	Ruiz-Rojas et al., 2024	Cross-country	University students	To investigate the influence of generative AI tools on students' collaborative learning and critical thinking in higher education.	M.M	AI tools support collaboration and critical thinking, though sustained training and technical guidance are necessary for effective implementation.
S16	Mahapatra, 2024	India	University students	To explore the impact of ChatGPT on ESL students' academic writing skills.	M.M	The study strengthens and advances theories of feedback as a dialogic tool and ChatGPT as a reliable writing tool, and has practical implications. With proper student training, ChatGPT can be a good feedback tool in large-size writing classes.
S17	Anani et al., 2025	Ghana	University students	To explore the use of AI for academic writing in higher education."	M.M	AI-assisted learning improves writing quality and motivation, while raising concerns related to dependency, ethical use, and content reliability.
S18	Zhao et al., 2024	United Kingdom	University students	To examine how ChatGPT and generative AI are affecting students' writing practices in higher education and how these changes relate to the wider digitization of writing.	Qual.	Students used generative AI as part of an increasingly digitised writing process, with implications for writing practices, AI literacy, and the balance between technological assistance and students' own writing capabilities.

Study No.	Citation	Region	Population / Data Source	Purpose of the Study	Method	Key Findings
S19	Wang, 2025	The USA	University students	To explore native and nonnative English speakers students' perceptions of generative AI-assisted writing processes.	M.M	The dilemma of weighing the potential loss of learning experiences against the emergence of new learning opportunities accompanying AI integration
S20	Akhmedjanova et al., 2025	Russia	Faculty members	To examine faculty members' experiences of using AI tools to support research writing and publication practices in higher education.	M.M	Findings informed immediate redesign of the writing center's offerings by strengthening attention to AI ethics and literacy, extending course formats, and maintaining hands on learning as a core principle.

Commentary Note. Qual = qualitative; Quan = quantitative; M.M. = mixed methods; R = review; C = commentary/conceptual analysis. Studies were not treated as methodologically equivalent. Primary empirical studies were used as the principal basis for interpreting reported educational outcomes, whereas review and commentary/conceptual publications were used primarily to contextualise, compare, and interpret broader pedagogical, ethical, and policy themes.

3.1.4 Key Themes in AI-Assisted Writing Tools in Education

The thematic synthesis identified several recurring dimensions across the 20 included studies. These dimensions overlap rather than function as isolated categories. The most prominent themes concerned writing support and efficiency, cognitive engagement, ethical and integrity-related challenges, contextual mediation, and the preservation of independent authorship.

Writing support was addressed directly in studies such as Anani et al. (2025), Mahapatra (2024), Marzuki et al. (2023), and C. Wang (2025). Across these studies, AI was primarily discussed as a resource for generating ideas, improving language, organizing content, drafting, or revising text. The evidence consequently supports the interpretation of AI as a writing aid with multiple procedural functions rather than as a direct substitute for academic authorship.

A second theme concerned cognitive engagement. The studies by Schei et al. (2024) and Zhai et al. (2024) illustrate the tension between assistance and dependence. AI can reduce procedural difficulty, but the same reduction in effort may become problematic when students no longer engage actively with the reasoning underlying their writing. This suggests that the educational effect of AI depends partly on whether students use generated output as material for reflection and revision or as a substitute for independent thought.

A third theme involved accessibility and support for writers who experience linguistic difficulty. Several studies examining student writing practices suggest that AI can provide immediate language-related assistance and reduce some barriers associated with vocabulary, sentence construction, and revision. However, these advantages should not be interpreted as evidence that AI independently develops writing competence. Rather, they indicate that AI can provide additional support within a wider instructional process.

Ethical and integrity-related concerns formed another substantial theme. The reviewed literature identified authorship ambiguity, inaccurate or unverifiable information, plagiarism-related concerns, inappropriate attribution, and uncertainty concerning acceptable AI use. These issues were especially visible in studies focused on academic integrity and responsible AI use, including Akhmedjanova et al. (2025), Anani et al. (2025), Gasaymeh et al. (2024), and Zhao et al. (2024).

Finally, several studies indicated that the educational consequences of AI use are shaped by instructional and institutional conditions. These conditions include instructor guidance, assessment design, training, ethical expectations, and institutional policy. The evidence therefore supports a contextual interpretation in which the technology itself does not determine educational outcomes.

Table 4. Core Themes Identified in Research on AI-Assisted Writing Tools

Core Theme	Thematic Dimensions	Educational Significance	Representative Studies
Writing accuracy and efficiency	Language refinement, drafting, revision, organization, coherence	AI can support procedural and linguistic aspects of academic writing	S4, S5, S10, S16, S17, S19
Cognitive engagement	Idea development, evaluation of AI output, critical engagement, risk of passive acceptance	Benefits are more educationally meaningful when students remain cognitively involved	S5, S7, S10, S19

Core Theme	Thematic Dimensions	Educational Significance	Representative Studies
Accessibility and linguistic support	Vocabulary, phrasing, sentence reformulation, language assistance	AI may reduce some linguistic barriers to academic writing	S4, S16, S17, S19
Over-reliance and cognitive risk	Dependence, reduced analytical engagement, surface-level processing	Uncritical use may weaken opportunities for independent reasoning	S2, S5, S7, S10, S19
Academic integrity	Authorship, plagiarism, attribution, misinformation	AI complicates conventional understandings of authorship and academic honesty	S1, S8, S11, S12, S13, S14, S17
Contextual mediation	Instructor guidance, training, policy, assessment design	Educational outcomes depend partly on how AI is embedded in educational practice	S4, S5, S14, S15, S17, S20
Independent authorship	Student responsibility, evaluation, revision, reflection	AI is most appropriately positioned as support rather than replacement	S5, S10, S16, S19, S20

Note. S = study identifier corresponding to Table 3. Representative studies indicate the studies from which the thematic interpretation was derived; they are not intended to imply identical findings across all studies.

3.1.5 Academic Integrity and Ethical Challenges

Academic integrity emerged as a major concern across the reviewed evidence base, although the specific ethical issue varied among studies. The principal concerns involved authorship ambiguity, plagiarism and similarity, inaccurate or fabricated information, citation practices, and uncertainty regarding acceptable levels of AI assistance.

Authorship ambiguity was particularly important because generative AI can contribute language or content at different stages of the writing process. Studies examining academic integrity and student perceptions suggest that uncertainty increases when AI moves beyond basic language correction and begins to contribute substantive portions of a text. This issue is reflected in the findings of Akhmedjanova et al. (2025), Anani et al. (2025), Artyukhov et al. (2024), and Kim et al. (2025), although these studies approached the issue from different methodological and contextual perspectives.

Plagiarism and attribution constitute another recurring concern. Li et al. (2024) conducted a scoping review of ChatGPT's ethical implications in higher education and identified recurring concerns involving misinformation, authorship in academic publishing, and data protection. McIntire et al. (2024) approached academic dishonesty from a broader perspective, emphasizing the consequences of dishonest academic behavior for learning. Ruiz-Rojas et al. (2024) similarly highlighted the importance of educational intervention and institutional mechanisms in reducing dishonest academic behavior.

The reliability of AI-generated information also creates an ethical dimension because students remain responsible for the accuracy of information incorporated into academic writing. Gasaymeh et al. (2024) identified concerns related to misinformation, privacy, and data security, while other studies in the corpus highlighted the need for users to evaluate AI-generated content critically.

The synthesis therefore suggests that ethical problems associated with AI-assisted writing are not reducible to plagiarism alone. They also involve responsibility for generated content, authorship, attribution, transparency, and verification. These issues reinforce the importance of explicit institutional expectations and instructional practices that help students understand appropriate and inappropriate forms of AI assistance.

Overall, the evidence presented in Table 5 suggests that ethical challenges associated with AI-assisted writing are not solely technological in nature but are strongly shaped by institutional clarity, pedagogical framing, and student awareness. This reinforces the need for proactive governance rather than reactive regulation in addressing academic integrity in AI-integrated learning environments.

Table 5. Academic Integrity and Ethical Challenges in AI-Assisted Academic Writing

Ethical Dimension	Reported Issues	Representative Findings	Representative Studies
Authorship ambiguity	Unclear boundaries between student and AI contribution	Generative AI complicates responsibility for text when assistance extends beyond surface-level editing	S5, S10, S17, S19
Plagiarism and attribution	Similarity, unattributed AI contribution, inappropriate use of generated text	AI-assisted writing creates new questions about attribution and academic honesty	S8, S11, S12, S13, S14
Information reliability	Misinformation, inaccurate or unverifiable content	AI output requires human verification before incorporation into academic writing	S1, S2, S7, S12

Ethical Dimension	Reported Issues	Representative Findings	Representative Studies
Citation practices	Inaccurate, incomplete, or inappropriate attribution	Academic writers need to verify AI-supported claims and references	S1, S8, S12
Policy uncertainty	Differences in acceptable AI use across courses or institutions	Unclear expectations can increase uncertainty regarding responsible use	S5, S14, S17, S20
Ethical literacy	Limited understanding of responsible AI use	Explicit instruction and institutional guidance can support more informed AI practices	S11, S14, S17, S20

Note. *This table synthesizes ethical issues reported or discussed in the included studies. It does not represent new empirical findings.*

As shown in Table 5, the ethical challenges associated with AI-assisted academic writing are primarily centred on issues of authorship ambiguity, unintentional plagiarism risk, and citation inaccuracy. Across the reviewed studies, these concerns reflect difficulties in distinguishing between student and AI contributions, as well as challenges in ensuring originality and accuracy when AI-generated content is incorporated into academic work. The synthesis further indicates that these issues are often intensified by limited ethical literacy among students and inconsistent institutional policies, which together contribute to uncertainty regarding acceptable AI use. Overall, the findings suggest that ethical risks are shaped not only by the capabilities of AI tools but also by the clarity of pedagogical guidance and regulatory frameworks within higher education contexts.

3.1.6 Influence of Pedagogical and Institutional Context

The reviewed evidence indicates that pedagogical and institutional conditions influence how AI-assisted writing is experienced and used. This conclusion was supported by studies addressing student practices, instructional intervention, academic integrity, and research-writing development, although the specific contextual factors differed across studies.

Instructor guidance was one of the clearest contextual factors. Studies examining writing activities suggest that students benefit more when AI use is incorporated into structured tasks in which they are expected to evaluate, revise, and justify AI-generated material. L. Wang and Ren (2024), for example, examined AI-supported collaborative academic writing, while Mahapatra (2024) investigated ChatGPT as part of an intervention involving ESL academic writing. Akhmedjanova et al. (2025) similarly examined AI-supported research writing within higher-education academic development courses and highlighted the importance of AI literacy and pedagogical redesign.

Assessment design also appears to influence the consequences of AI use. Where students are required to document their writing processes, explain revisions, or demonstrate independent reasoning, AI can be positioned as part of a learning activity rather than as an alternative to learning. Conversely, assessment tasks that evaluate only the final product may provide fewer opportunities to observe how students arrived at their answers or how they interacted with AI support.

Institutional policy represents another important contextual factor. Dwivedi et al. (2023), Gasaymeh et al. (2024), and other studies concerned with ethical AI use indicate that students may face uncertainty when institutional expectations are unclear. Clear guidance can establish boundaries concerning disclosure, authorship, acceptable assistance, verification, and academic integrity.

The evidence therefore supports a moderated interpretation of AI-assisted writing outcomes. Access to AI tools alone does not guarantee improved learning or responsible use. Instead, outcomes depend partly on the pedagogical and institutional environments in which the tools are introduced. The role of instructors, assessment practices, AI-literacy development, and institutional policy should therefore be considered when interpreting both the benefits and risks identified in the review as shown in Table 6.

Table 6. Role of Pedagogical and Institutional Context in AI-Assisted Writing Outcomes

Contextual Factor	Instructional Characteristics	Observed Outcomes	Representative Studies
Guided AI use	Explicit explanation of appropriate AI use and critical evaluation of output	Greater opportunity for active engagement and responsible use	S5, S16, S17, S20
Unguided use	Limited explanation or monitoring of AI-supported writing	Greater potential for dependence and passive acceptance	S5, S7, S10, S19
Assessment alignment	Tasks requiring explanation, reflection, revision, or documentation of process	Greater visibility of student reasoning and authorship	S5, S16, S20
Policy clarity	Explicit institutional expectations concerning AI use and disclosure	Reduced uncertainty concerning academic integrity	S1, S14, S17, S20
AI literacy and training	Instruction concerning evaluation, verification, ethics, and responsible use	Better preparation for critical and informed AI engagement	S7, S14, S15, S20
Instructor mediation	Feedback and discussion surrounding AI-assisted drafts	Greater opportunity to integrate AI into learning rather than replace learning	S4, S5, S16, S20

Note. *The table summarises contextual patterns identified across the included studies. The representative studies differ in design and context and should not be interpreted as methodologically equivalent.*

As summarised in Table 6, studies consistently show that guided AI use is associated with more positive educational outcomes. In these contexts, instructors explicitly define acceptable practices and encourage students to critically evaluate AI-generated output. This approach positions AI as a supportive tool, which in turn rather than writing assistants, which can weaken authorial voice and limit independent cognitive processing. Assessment design also plays an important moderating role. Tasks that require reflection, justification, or documentation of the writing process tend to reduce dependency on AI-generated content and promote deeper engagement with academic writing. This indicates that learning outcomes are shaped not only by access to AI tools but also by how assessment tasks are structured in relation to them. Similarly, institutional policy clarity and instructor mediation are repeatedly identified as key enabling factors. Transparent guidelines and active feedback mechanisms contribute to reduced ethical uncertainty and improved learning outcomes by helping students navigate acceptable boundaries of AI use. Overall, the evidence presented in Table 6 suggests that the impact of AI-assisted academic writing is not determined by the technology itself, but rather by the pedagogical and institutional conditions in which it is embedded.

3.2 Discussion

The qualitative synthesis of the included studies indicates that human–AI interaction in academic writing fosters higher levels of engagement and more responsible writing practices. By contrast, unguided or weakly structured use of AI tools is frequently linked to over-reliance and reduced critical engagement. When expectations are not clearly articulated, students are more likely to treat AI systems as content generators is characterized by a complex relationship between increased writing efficiency, learning support, human judgment, and emerging ethical concerns. Across the included evidence base, studies reported a range of potential benefits associated with AI-assisted writing, including support for idea generation, language refinement, drafting, revision, organization, and writing efficiency. These benefits were not uniformly examined across all studies and should therefore be interpreted in relation to the specific populations, methods, and writing activities investigated.

At the same time, the evidence also identifies important concerns related to overreliance, academic integrity, authorship, critical engagement, and the changing role of human judgment. These findings suggest that the educational significance of AI-assisted academic writing cannot be understood solely in terms of efficiency or productivity; rather, its value depends on how learners and educators interact with AI systems and how this interaction is situated within pedagogical and institutional contexts. To organize this interpretation, Figure 2 presents a conceptual overview of educational impact pathways associated with AI-assisted writing tools in higher education.

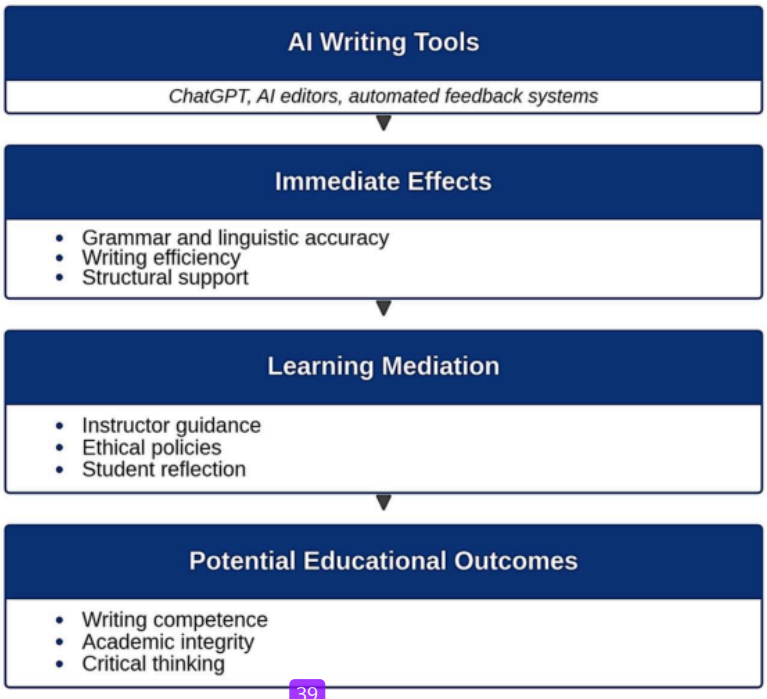


Figure 2. Educational Impact Pathways of AI-Assisted Academic Writing Tools in Higher Education

As depicted in Figure 2, AI-assisted writing tools initially influence aspects of writing such as linguistic accuracy, sentence formulation, and textual organization. However, these immediate effects should not be interpreted as fixed outcomes of the technology itself. Rather, they are mediated through pedagogical guidance and ethical frameworks that shape how students interpret, evaluate, and use AI-generated support. The reviewed literature suggests that these interactions may contribute to broader educational outcomes, including writing development, critical thinking, and responsible academic practice. Because relatively few studies have examined the long-term consequences of sustained AI use, these outcomes are presented in the framework as potential educational outcomes rather than established long-term effects.

In this regard, studies such as Marzuki et al. (2023) and L. Wang and Ren (2024) provide converging evidence that AI tools can improve textual coherence and structural development when embedded within guided writing tasks. Similarly, student-focused research indicates that learners increasingly perceive AI as a form of scaffolding or digital peer support rather than a replacement for their own writing effort. This perception is important because it reflects a gradual normalization of AI as part of the writing process, while still preserving a sense of human authorship when appropriately regulated. At the same time, the review highlights that these benefits are accompanied by important cognitive risks. As synthesized across the literature, over-reliance on AI tools may gradually reduce students' engagement in higher-order thinking processes, particularly analysis, evaluation, and argument construction. Zhai et al. (2024) provide systematic evidence that excessive dependence on AI dialogue systems can weaken critical reasoning skills, especially when learners accept AI output without interrogation. This concern is echoed in studies such as Schei et al. (2024), in which students report reduced originality and a tendency toward surface-level engagement when AI is used uncritically. However, the evidence is not uniformly negative. A more nuanced pattern emerges when AI use is embedded within collaborative or inquiry-based pedagogical designs. Ruiz-Rojas et al. (2024), for example, demonstrate that generative AI can support critical thinking and peer interaction when integrated into structured learning activities. This suggests that cognitive outcomes are not determined by the tool itself, but by how it is pedagogically positioned. In other words, AI does not inherently diminish or enhance cognition; rather, it amplifies the instructional environment in which it operates.

This contextual sensitivity is further reinforced by Gawlik-Kobylińska (2024), who reports that students simultaneously value AI for idea generation and efficiency while expressing concern about dependency. This dual perception reflects an emerging tension in higher education: AI is experienced as both enabling and potentially limiting, depending on how it is used. Such ambivalence supports the broader argument advanced in this review that cognitive engagement is not simply reduced by AI use but reshaped through patterns of reliance, reflection, and instructional framing.

Ethical considerations represent another central dimension of the discussion. Across the reviewed studies, academic integrity emerges as a persistent and evolving concern. The synthesis presented in Table 5 highlights recurring issues related to authorship ambiguity, plagiarism risk, citation inaccuracy, and inconsistent institutional policies. These challenges reflect a deeper structural problem: existing academic integrity frameworks were not designed for environments where text generation can be partially or fully automated.

Akhmedjanova et al. (2025) emphasize this duality by showing that AI simultaneously expands access to learning resources while introducing new forms of academic risk. Similarly, Fiorillo (2024) argues that ethical challenges are not inherent to AI itself but emerge from the absence of clear regulatory and pedagogical guidance. From this perspective, AI does not undermine academic integrity by default; rather, ambiguity in expectations and lack of transparency in use create conditions where integrity violations become more likely. This interpretation is further supported by Marzuki et al. (2023), who reframe academic misconduct as a situational response to pressure rather than purely an ethical deficit. When combined with findings from Dahlen et al. (2024), the literature suggests that informational or punitive approaches alone are insufficient. Instead, what is required is a coherent institutional ecosystem that combines clear policy, ethical literacy, and consistent instructional practice.

Pedagogical mediation, therefore, emerges as a decisive factor in shaping outcomes. As summarised in Table 6, guided AI use (in which instructors explicitly define acceptable practices and encourage critical evaluation of AI output) is consistently associated with more positive learning outcomes. In contrast, unguided use tends to result in over-reliance, reduced critical engagement, and weaker authorial voice. Assessment design further strengthens or weakens this relationship. Tasks that require justification, reflection, or process documentation encourage students to engage more deeply with content and reduce dependency on AI-generated text.

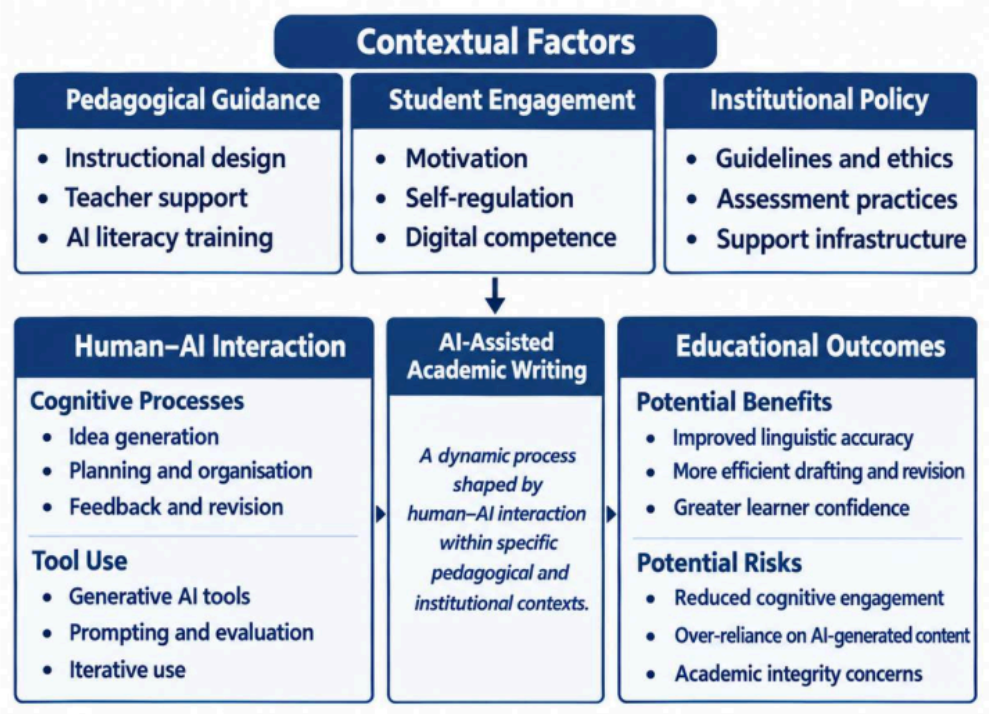


Figure 3. Balance between AI-assisted writing support and independent cognitive engagement

Figure 3 synthesizes this relationship by illustrating the balance between AI-assisted writing support and independent cognitive engagement. When instructional guidance is limited, AI tools tend to shift from scaffolds to substitutes, increasing the risk of passive learning and reduced originality. Conversely, when pedagogy is intentionally designed, AI becomes a cognitive support system that enhances rather than replaces student thinking. This balance underscores a central finding of this review: the educational value of AI-assisted writing is not inherent in the technology, but is constructed through pedagogy. Taken together, these findings suggest that AI-assisted academic writing should be understood as a context-dependent educational practice rather than a fixed technological effect. The review therefore aligns with Deep and Chen (2025) while extending their argument by explicitly foregrounding the mediating role of institutional and pedagogical conditions. This shift in emphasis is important because it moves the debate beyond binary claims of benefit or harm and toward a more situated understanding of human–AI interaction in academic writing environments. Overall, the discussion indicates that AI-assisted writing tools are most effective when they are embedded within structured learning environments that promote critical engagement, ethical awareness, and sustained authorship responsibility. Without such conditions, the same tools may contribute to surface-level learning and ethical uncertainty. The main issue, therefore, is not whether AI should be employed in academic writing, but how it is integrated into the educational process in ways that preserve intellectual agency while leveraging technological support.

3.2.1 Research Contribution

The present qualitative thematic synthesis makes several important contributions to the growing body of scholarship on AI-assisted academic writing in higher education. First, it provides an updated synthesis of recent empirical and conceptual research published during a period of rapid technological advancement, offering a comprehensive understanding of how generative AI is reshaping academic writing practices. While previous reviews have primarily focused on either the technical capabilities of AI writing tools or isolated concerns regarding academic integrity, the present review adopts a broader educational perspective that integrates pedagogical, cognitive, and ethical dimensions within a single analytical framework.

Second, the review extends the work of Deep and Chen (2025) by demonstrating that the educational impact of AI-assisted writing cannot be explained solely through the capabilities of AI technologies. Rather, the findings consistently indicate that educational outcomes emerge from the interaction between technological affordances, learner agency, pedagogical mediation, and institutional governance. This context-dependent perspective moves beyond binary debates that characterise AI as either beneficial or harmful and instead positions AI-assisted writing as a dynamic educational practice whose effectiveness depends on how it is implemented within higher education.

A further contribution lies in the conceptual integration of findings across diverse educational contexts. By synthesizing evidence from studies employing qualitative, quantitative, mixed-methods, and review methodologies, this study identifies recurring themes that transcend disciplinary and geographical boundaries. The review demonstrates that improvements in writing quality, learner confidence, and writing efficiency are consistently associated with structured pedagogical support, whereas cognitive risks and ethical concerns become more pronounced in the absence of clear instructional guidance. These recurring patterns contribute to a more coherent understanding of the mechanisms through which AI influences academic writing.

Moreover, the conceptual models proposed in Figures 2 and 3 represent an additional contribution of this review. Figure 2 illustrates the educational pathways through which AI-assisted writing influences learning outcomes by emphasizing the mediating roles of pedagogy and ethics, while Figure 3 conceptualizes the balance between technological support and independent cognitive engagement. Together, these frameworks provide an integrative perspective that may assist researchers, educators, and policymakers in understanding AI-assisted writing as a multidimensional educational phenomenon rather than merely a technological innovation.

Finally, this review contributes to the emerging discourse on human–AI collaboration by reaffirming that meaningful educational innovation depends upon preserving human intellectual agency. Rather than positioning AI as a replacement for academic thinking, the synthesis supports a human-centered interpretation in which AI functions as a cognitive support while students retain responsibility for critical analysis, evaluation, and scholarly authorship.

3.2.2 Implications

Findings obtained from this review have crucial implications for higher education and the broader integration of AI into academic writing and teaching practices. As generative AI becomes increasingly accessible to students and educators, its successful implementation requires a shift from viewing it primarily as a writing assistant toward recognising it as a pedagogical resource that supports academic writing development through guided interaction and critical engagement. For university educators and academic writing instructors, this implies that AI should be incorporated into instructional design in ways that support students' writing development while simultaneously promoting higher-order thinking and independent authorship.

One important implication concerns the evolving role of teachers. Rather than serving solely as providers of linguistic knowledge, instructors are increasingly required to act as facilitators who help students critically evaluate, adapt, and refine AI-generated content. This changing role involves teaching learners how to question AI outputs, identify inaccuracies, verify sources, and make informed decisions regarding the appropriate integration of AI-generated suggestions into their own academic writing. Such instructional practices encourage students to develop critical AI literacy alongside traditional academic literacy, thereby reducing the likelihood of passive dependence on automated writing systems.

The review also highlights the importance of curriculum redesign within higher education programs. Existing writing curricula may require revision to accommodate AI-assisted learning while maintaining the fundamental objectives of academic writing instruction in higher education. Rather than prohibiting AI use entirely, educational programs should establish clear guidelines regarding acceptable and responsible applications of AI throughout the writing process. Classroom activities that require students to compare AI-generated and self-produced texts, justify revisions, reflect on their writing decisions, and document their interactions with AI systems can promote metacognitive awareness while preserving learner autonomy and academic integrity.

Assessment practices similarly require reconsideration in response to AI-assisted writing. Traditional product-oriented assessments may become increasingly insufficient for evaluating authentic student learning when AI tools are readily available. The findings suggest that greater emphasis should be placed on process-oriented assessment strategies that evaluate drafting, revision, reflection, peer feedback, and critical engagement with AI-generated content. Such approaches allow instructors to assess not only the quality of final written products but also the cognitive processes underlying academic writing, thereby reducing opportunities for inappropriate AI dependence while encouraging meaningful learning.

Institutional policy represents another important implication emerging from the present review. Higher education institutions should develop comprehensive AI governance frameworks that clearly define acceptable AI practices, disclosure requirements, and ethical responsibilities for both students and instructors. Consistent institutional guidance can reduce uncertainty surrounding AI use while fostering a culture of transparency and responsible academic practice. Professional development initiatives are equally important, as many educators continue to report uncertainty regarding the pedagogical integration of AI technologies. Providing instructors with training in AI literacy, prompt engineering, ethical decision-making, and assessment redesign will facilitate more effective and confident implementation across diverse educational contexts.

Finally, the findings emphasize that the future of AI integration within higher education should be guided by human-centered educational principles. Although generative AI offers considerable opportunities for improving academic writing development and learner engagement, these benefits can only be realised when technological innovation remains aligned with the

broader educational goals of fostering critical thinking, creativity, ethical responsibility, and communicative competence. Consequently, successful AI integration should prioritise collaboration between learners, educators, and intelligent technologies, ensuring that AI complements rather than replaces the intellectual and linguistic development that remains central to effective academic writing instruction in higher education.

3.2.3 Limitations

Although this qualitative thematic synthesis provides a comprehensive overview of the existing literature, several limitations should be acknowledged when interpreting its findings. First, although the review adopted a systematic and transparent approach to identifying, screening, and synthesizing relevant studies, it did not undertake a statistical meta-analysis of effect sizes. Consequently, the study focuses on identifying recurring patterns, conceptual relationships, and thematic consistencies rather than quantifying the magnitude of AI-assisted writing effects across different educational contexts. While this qualitative synthesis enables a richer interpretation of complex educational phenomena, it limits the ability to make statistically generalisable claims regarding the effectiveness of AI-assisted academic writing.

Second, the reviewed studies demonstrate considerable methodological diversity. The evidence base includes qualitative investigations, quantitative surveys, mixed-methods studies, systematic reviews, and conceptual analyses conducted across different countries, institutions, and academic disciplines. Although this diversity enriches the review by providing multiple perspectives, it also introduces variability in research designs, participant characteristics, educational settings, and outcome measures. Such heterogeneity inevitably limits direct comparison across studies and should be considered when interpreting the overall findings.

Another important limitation concerns the rapidly evolving nature of generative AI technologies. The capabilities of systems such as ChatGPT and other large language models continue to develop at an unprecedented pace, accompanied by frequent software updates, emerging educational applications, and evolving institutional policies. Consequently, some findings reported in the reviewed studies may reflect earlier stages of AI development and may require re-evaluation as technologies become increasingly sophisticated and educational practices continue to adapt. The dynamic nature of AI therefore presents an ongoing challenge for review studies, as evidence may quickly become outdated in response to technological innovation.

The review is also constrained by the characteristics of the existing literature. A substantial proportion of published studies rely on students' and instructors' self-reported perceptions, attitudes, and experiences rather than objective measures of learning outcomes or writing development. Although perception-based research provides valuable insights into users' experiences and acceptance of AI technologies, self-report data may be influenced by response bias, novelty effects, or differences in participants' previous experience with AI tools. As a result, reported benefits or concerns may not always correspond to measurable improvements in writing performance or cognitive development.

Furthermore, relatively few studies have examined the long-term educational consequences of sustained AI use. Most existing research adopts cross-sectional or short-term research designs, making it difficult to determine whether improvements in writing quality, learner confidence, or efficiency persist over time or whether prolonged AI use influences students' independent writing abilities, critical thinking skills, and academic identity. Longitudinal evidence remains limited, restricting our understanding of how continuous interaction with AI shapes learning trajectories throughout higher education.

Finally, although the present review incorporated studies from diverse educational contexts, disciplinary representation remains uneven. Many investigations focus on English language learning, academic writing instruction, or higher education settings in technologically advanced institutions. Consequently, the applicability of the findings to other disciplines, educational levels, or resource-constrained environments should be interpreted with caution. Future evidence drawn from a broader range of disciplinary, linguistic, and cultural contexts will contribute to a more comprehensive understanding of AI-assisted academic writing across global higher education.

3.2.4 Suggestions

The findings of this review highlight several promising directions for future research that can deepen understanding of AI-assisted academic writing and support evidence-based educational practice. As generative AI technologies continue to evolve, research should move beyond documenting user perceptions towards investigating the long-term educational consequences of sustained human–AI collaboration. Longitudinal studies following students throughout their academic programs would provide valuable evidence regarding how continuous AI use influences writing proficiency, critical thinking, learner autonomy, academic identity, and the development of disciplinary expertise over time.

Future research should also employ more rigorous experimental and quasi-experimental designs to establish causal relationships between AI integration and educational outcomes. Comparative studies examining guided and unguided AI use, different instructional approaches, and alternative assessment strategies would help identify the pedagogical

conditions under which AI most effectively supports meaningful learning. Such research would enable educators to distinguish between technological effects that arise from AI itself and those that result from instructional design, teacher guidance, or learner characteristics.

Another important avenue for future investigation concerns disciplinary variation. Academic writing expectations differ substantially across fields such as applied linguistics, engineering, medicine, social sciences, and the humanities. Future studies should therefore explore how disciplinary conventions influence students' use of AI-assisted writing tools, the nature of human–AI collaboration, and the ethical challenges associated with AI-generated content. Comparative research across disciplines would contribute to the development of context-specific pedagogical frameworks that acknowledge the distinctive writing practices of different academic communities.

Ethical literacy also represents a critical area requiring further investigation. Although academic integrity has emerged as one of the dominant themes within the current literature, relatively little is known about how students develop the ethical judgment required to use AI responsibly throughout their academic careers. Future research should examine instructional interventions that promote transparency, responsible disclosure, source verification, and reflective decision-making while evaluating their effectiveness in fostering sustainable ethical AI practices among university students.

Institutional and policy-related research is equally necessary. As universities continue to develop AI governance frameworks, comparative studies investigating institutional policies across countries and higher education systems would provide valuable evidence regarding best practices for responsible AI implementation. Research examining how policy clarity, faculty training, and institutional support influence educational outcomes would contribute to more coherent governance models that balance innovation with academic integrity.

From an ELT perspective, future studies should investigate how AI-assisted writing influences second language acquisition, vocabulary development, grammatical accuracy, genre awareness, and communicative competence across different levels of language proficiency. Greater attention should also be given to teacher professional development, particularly the knowledge, skills, and pedagogical competencies required for effective AI integration within language classrooms. Understanding how educators adapt their instructional practices in response to emerging AI technologies will be essential for ensuring that technological innovation complements rather than replaces sound language pedagogy.

Finally, future research should increasingly adopt interdisciplinary approaches that integrate perspectives from education, applied linguistics, cognitive psychology, educational technology, ethics, and computer science. The educational implications of generative AI extend far beyond technological performance alone, encompassing cognitive development, institutional governance, learner psychology, and professional practice. Collaborative interdisciplinary research will therefore be essential for developing comprehensive theoretical frameworks capable of guiding the responsible and sustainable integration of AI-assisted academic writing within higher education.

4. CONCLUSION

This qualitative thematic synthesized contemporary research on AI-assisted academic writing in higher education to develop a comprehensive understanding of how generative AI is transforming academic writing practices. By integrating evidence from empirical and conceptual studies, the review examined the pedagogical opportunities, cognitive implications, ethical challenges, and institutional dimensions associated with AI-assisted writing. The synthesis demonstrates that the educational impact of AI cannot be understood as a direct consequence of technological capability alone but rather as the result of complex interactions among learners, educators, pedagogical design, and institutional governance.

The reviewed evidence consistently indicates that AI-assisted writing tools can make valuable contributions to academic writing by supporting idea generation, linguistic refinement, organizational coherence, and writing efficiency. However, these benefits are neither automatic nor universal. Their effectiveness depends on learners maintaining critical engagement with AI-generated content and on educators creating learning environments that encourage reflection, independent judgment, and responsible authorship. In this respect, AI functions most effectively as a cognitive partner that complements rather than replaces human intellectual effort.

At the same time, the review highlights that responsible AI integration requires equal attention to ethical considerations and pedagogical practice. Questions of academic integrity, transparency, authorship, and responsible AI use remain central to the successful adoption of generative AI in higher education. The evidence suggests that these challenges are best addressed through coherent institutional policies, effective pedagogical guidance, and the development of AI literacy among both students and educators. Consequently, the educational value of AI is determined less by the sophistication of the technology than by the quality of the educational environments in which it is employed.

Overall, this review supports a human-centered perspective on AI-assisted academic writing in which technological innovation serves to augment, rather than diminish, human learning and scholarly practice. Moving beyond simplistic debates that portray AI as either an educational solution or a threat to academic

integrity, the findings demonstrate that meaningful human–AI collaboration depends upon preserving critical thinking, ethical responsibility, and intellectual agency throughout the writing process. As generative AI continues to evolve, its long-term contribution to higher education will ultimately depend on how effectively institutions, educators, and learners work together to make sure that technological innovation remains aligned with the fundamental values of scholarship, responsible knowledge creation, and lifelong learning.

5. ACKNOWLEDGEMENT

We sincerely thank Professor Hamed Barjesteh and Dr. Mehdi Manoochehrzadeh for handling this special issue. We also thank all the editors, managers, and reviewers of *IJOPATE* for their insightful comments and support.

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APPENDIX A. DATABASE-SPECIFIC SEARCH STRINGS

To support search reproducibility, the exact search strings used in each of the five electronic databases are reported below. The same three concept blocks (AI/generative-AI tools, academic writing, and higher education) were combined with the Boolean operators AND/OR in every database; field tags and truncation symbols were adapted to each platform's indexing syntax. All searches were limited to English-language records published between 2023 and 2025 and were last run in January 2026.

Web of Science (Core Collection): TS=("artificial intelligence" OR "generative artificial intelligence" OR "generative AI" OR GenAI OR ChatGPT OR "large language model" OR "AI-assisted" OR "AI-supported") AND TS=("academic writing" OR "scholarly writing" OR "academic literacy" OR "writing instruction") AND TS=("higher education" OR universit OR college OR "tertiary education"). Refined by: Document Type = Article; Language = English; Publication Years = 2023–2025.

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ERIC (EBSCOhost): AB ("artificial intelligence" OR "generative artificial intelligence" OR "generative AI" OR GenAI OR ChatGPT OR "large language model" OR "AI-assisted" OR "AI-supported") AND AB ("academic writing" OR "scholarly writing" OR "academic literacy" OR "writing instruction") AND AB ("higher education" OR university OR college OR "tertiary education"). Limiters: Peer-reviewed; Publication Date 2023–2025; English.

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PubMed: ("artificial intelligence"[tiab] OR "generative artificial intelligence"[tiab] OR "generative AI"[tiab] OR GenAI[tiab] OR ChatGPT[tiab] OR "large language model"[tiab] OR "AI-assisted"[tiab] OR "AI-supported"[tiab]) AND ("academic writing"[tiab] OR "scholarly writing"[tiab] OR "academic literacy"[tiab] OR "writing instruction"[tiab]) AND ("higher education"[tiab] OR university [tiab] OR college[tiab] OR "tertiary education"[tiab]). Filters: 2023–2025; English.

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