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Generative Artificial Intelligence in Doctoral Writing within Elite Universities: Usage Patterns and Perceived Benefits and Limitations

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Abstract
This study employs a cross-sectional convergent mixed-methods design to examine 298 doctoral students' use of generative artificial intelligence (AI) in academic writing across STEM, Social Sciences, and Humanities in three elite Ethiopian universities. Quantitative data were analyzed using descriptive and inferential statistics, while qualitative data were thematically analyzed to explore perceived usefulness, ease of use, usage patterns, and contextual experiences of AI adoption. Findings indicate that generative AI is widely used as a strategic tool to enhance linguistic quality, writing efficiency, and textual organization, with adoption driven primarily by task-specific needs rather than disciplinary affiliation. AI merges as an academic support system that enhances writing efficiency and idea development, particularly through linguistic refinement and productivity gains, while simultaneously being approached with critical reflexivity regarding its benefits and limitations. The study concludes that generative AI represents a transformative yet cautiously adopted tool in doctoral writing, where its benefits are balanced against ethical and epistemic concerns. These findings inform pedagogical and policy efforts for responsible AI integration in higher education. However, the study is limited by self-reported data and a cross-sectional design, restricting generalizability and causal inference.
Key words: *Generative artificial intelligence; doctoral writing; academic integrity; higher education; elite universities*
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Introduction

Generative Artificial Intelligence (AI) has rapidly emerged as a transformative force in higher education, particularly in the domain of academic writing. Tools such as ChatGPT, Grammarly, and Google Bard are increasingly being integrated into doctoral students' writing practices to support idea generation, organization, drafting, and language refinement. This growing reliance reflects a broader shift toward AI-augmented scholarship, where human cognitive processes are complemented by machine intelligence (Dwivedi et al., 2023; Kasneci et al., 2023; Qian, 2025).

Within doctoral education, writing is a central and complex activity requiring advanced cognitive, linguistic, and disciplinary expertise. Recent studies show that generative AI significantly enhances research productivity, writing efficiency, and language development, particularly for postgraduate and doctoral students (Mabirizi et al., 2025). Empirical research further demonstrates that doctoral students use AI for multiple writing-related purposes, including idea exploration, drafting, and revision, often across numerous distinct tasks (Zhang et al., 2025). Similarly, emerging evidence indicates that AI improves coherence, lexical richness, and overall quality of academic texts while providing real-time feedback and scaffolding support (Sanz-Tejeda et al., 2025).

The integration of artificial intelligence (AI) in education is accompanied by several significant challenges that require careful consideration. One major concern is the issue of academic integrity, as students may misuse AI tools to generate assignments, thereby undermining authentic learning and assessment practices. Additionally, there are concerns about data privacy and security, as AI systems often rely on large amounts of personal and institutional data, which may be vulnerable to misuse or breaches. Another challenge lies in the digital divide, where unequal access to technological resources can exacerbate existing educational inequalities, particularly in under-resourced contexts. Furthermore, educators may lack adequate training to effectively integrate AI into teaching and learning processes, limiting its pedagogical potential. There are also ethical concerns regarding algorithmic bias, which can lead to unfair or discriminatory outcomes in educational settings. Therefore, while AI offers promising opportunities, addressing these challenges is essential for its responsible and equitable implementation in education (Holmes & Tuomi, 2022; UNESCO, 2021).

At the same time, concerns have been raised regarding issues of academic integrity, overreliance, authorship, and the potential erosion of critical thinking skills. Recent systematic reviews highlight ethical risks such as AI-assisted plagiarism, data fabrication, and diminished metacognitive engagement among students (Mabirizi et al., 2025). More recent experimental evidence suggests that while AI-generated feedback can increase output, it may reduce students' engagement in revision processes, raising concerns about shallow learning (Farrokhnia et al., 2026). These tensions reinforce the dual role of AI as both an enabler and a disruptor in scholarly writing practices.

Furthermore, while some studies indicate broad similarities in AI usage across disciplines for general writing tasks, differences may emerge in relation to specialized academic practices (Archana, Renjith, Padmakumar, Shajitha, & Aboobaker, 2025; Chetiwal & Arulsamy, 2026; Parviz, 2024). Contemporary research shows that AI supports diverse academic functions, including technical writing, data analysis, and creative composition, depending on disciplinary demands (Bin Jwair, 2025). STEM students tend to focus more on technical competencies like programming and algorithmic thinking, while humanities students place greater emphasis on conceptual insight, ethical judgment, and the societal implications of AI (Abdullah & Abdulhameed, 2025). However, both groups share concerns about the lack of adequate institutional support for in-depth AI training. At the same time, qualitative studies reveal that AI influences not only writing outputs but also doctoral students' cognitive, emotional, and behavioral engagement with research writing processes (Li, 2025). This suggests that disciplinary epistemologies continue to shape how AI is integrated into doctoral writing.

Given these rapidly evolving dynamics, there is a clear need for empirical research that examines how generative AI is used within elite university contexts, focusing on doctoral students' usage patterns as well as their perceived benefits and limitations. As recent reviews emphasize, the expansion of AI in higher education necessitates robust institutional policies, ethical guidelines, and pedagogical frameworks to ensure responsible and effective integration (Lund & Wang, 2024; Parikh & Deka, 2025; Selwyn, 2023). Understanding these dimensions is therefore essential for informing future doctoral education in an AI-driven academic landscape.

Statement of the Problem

The rapid integration of generative artificial intelligence (AI) into higher education has significantly transformed academic writing practices, particularly at the doctoral level. Tools such as ChatGPT and other AI-assisted writing platforms are increasingly used for idea generation, drafting, and language refinement (Dwivedi et al., 2024; Kasneci et al., 2023). While these technologies offer clear advantages in terms of efficiency and productivity, their growing presence has outpaced the development of comprehensive academic frameworks and empirical research. As a result, there is limited systematic understanding of how doctoral students actually use generative AI in their writing processes, especially within high-performing academic environments.

Although recent studies have explored the general adoption of AI in education, there remains a notable gap in context-specific research focusing on elite universities. These institutions possess unique characteristics, including advanced technological infrastructure, strong research cultures, and highly competitive academic expectations, which may influence students' engagement with AI tools(Archana et al., 2025; Chetiwal & Arulsamy, 2026; Parviz, 2024). However, existing literature has largely treated students as a homogeneous group, overlooking how institutional context shapes usage patterns. Furthermore, insufficient attention has been given to how doctoral students perceive the benefits and limitations of AI, particularly in relation to academic integrity, authorship, and the development of independent scholarly skills (Cotton et al., 2023; Farrokhnia et al., 2026; Stokel-Walker, 2024).

In addition, while some research suggests that AI use may vary across disciplines, there is a lack of empirical evidence examining whether such differences persist within elite academic settings. It remains unclear whether doctoral students across disciplines engage with AI in similar ways or whether disciplinary epistemologies significantly shape their usage patterns and perceptions. This lack of clarity creates a critical research gap that limits the ability of universities to design informed policies and pedagogical strategies. Therefore, this study seeks to investigate generative AI use in doctoral writing within elite universities, with particular focus on usage patterns and perceived benefits and limitations, in order to contribute to a more nuanced and evidence-based understanding of AI integration in advanced academic contexts.

Research Questions

1. How do doctoral students in elite universities use generative artificial intelligence (GAI) in preparing dissertations and scholarly publications?
2. Are there statistically significant differences in GAI use among doctoral students across STEM, Social Sciences, and Humanities?
3. What perceived benefits and limitations do doctoral students in elite universities report regarding the use of generative AI in academic writing?

The significance of the study

This study is significant in several important ways for literature, research, students, supervisors, and policy makers. For the literature, it extends current understanding of generative AI in doctoral writing by focusing on elite university contexts and applying the Technology Acceptance Model (TAM) to a rapidly evolving area of academic practice, thereby filling a gap in existing research on advanced postgraduate writing. For research, it provides empirical evidence on usage patterns, perceived benefits, and limitations of AI tools among doctoral students across disciplines, offering a useful basis for future comparative and longitudinal studies on AI integration in higher education. For students, the study promotes more informed, effective, and ethical use of generative AI tools to enhance writing quality, productivity, and academic performance while maintaining awareness of potential limitations. For supervisors, it offers insights into how doctoral students engage with AI in their writing processes, supporting better academic guidance, mentoring, and integrity monitoring. For policy makers and university administrators, the findings provide evidence to inform the development of clear, balanced, and contextually appropriate policies on AI use in doctoral education, ensuring that innovation is encouraged while maintaining academic standards and integrity.

The theoretical Framework

This study is grounded in the Technology Acceptance Model (TAM) developed by Davis (1989), which explains users' acceptance and adoption of technology based on two core beliefs: perceived usefulness (PU) and perceived ease of use (PEOU). Perceived usefulness refers to the extent to which doctoral students believe that generative artificial intelligence tools enhance their academic writing performance, while perceived ease of use refers to the degree to which they believe these tools are effortless to learn and apply. In this study, TAM provides the foundational lens for understanding how doctoral students in elite universities come to accept and integrate generative AI into their academic writing processes.

Building on the core TAM framework, this study extends the model by incorporating attitude toward use as a mediating construct and usage patterns as the actual behavioral outcome. In this extended model, perceived ease of use is expected to influence both perceived usefulness and attitude toward generative AI, while perceived usefulness also directly shapes attitude. Attitude toward generative AI then determines the actual usage patterns in doctoral academic writing processes, including activities such as idea generation, drafting, editing, summarizing, and paraphrasing. In addition, the study incorporates post-use evaluations in the form of perceived benefits and perceived limitations, which emerge from students' lived experiences of using generative AI in academic writing tasks.

Furthermore, academic discipline is included as a moderating variable in the model, recognizing that doctoral students in STEM, social sciences, and humanities may differ in their acceptance and use of generative AI tools. Discipline is expected to influence the strength of relationships between TAM constructs (PU, PEOU, and attitude) and actual usage patterns, as well as shape the nature of perceived benefits and limitations. Overall, this integrated framework provides a comprehensive explanation of both the psychological determinants and contextual factors that shape generative AI adoption and use in doctoral academic writing within elite university settings.

Methodology

Research Design

This study adopts a cross-sectional design embedded within a convergent mixed-methods approach. The cross-sectional component enables the collection of quantitative and qualitative data at a single point in time to examine doctoral students' current usage patterns, perceptions, and experiences of generative artificial intelligence (AI) tools in academic writing within elite universities. This design is appropriate for identifying relationships among variables in the Technology Acceptance Model (TAM) without requiring longitudinal follow-up.

The study is further strengthened by a convergent mixed-methods design, in which quantitative and qualitative data are collected concurrently, analyzed separately, and then merged during interpretation. The quantitative strand is guided directly by TAM constructs, while the qualitative strand explores contextual meanings behind perceived usefulness, perceived ease of use, and actual usage experiences. This integration ensures both explanatory depth and statistical generalization.

Population and Sampling

The target population consists of doctoral students in elite universities. A stratified sampling technique is used to ensure proportional representation across academic disciplines, such as STEM, social sciences, and humanities. Academic discipline is included as a moderating variable in the theoretical framework, making its representation essential for valid model testing. For the quantitative strand, proportionate stratified random sampling is employed to ensure representativeness of TAM-related constructs across disciplines. For the qualitative strand, purposive sampling is used to select participants with direct experience using generative AI in academic writing, ensuring rich data on perceived usefulness, ease of use, benefits, and limitations.

The Technology Acceptance Model (TAM) serves as the primary theoretical foundation for instrument development. The structured questionnaire is directly constructed based on TAM constructs:

- Perceived Ease of Use (PEOU): measured through items assessing the simplicity, learnability, and effort required to use generative AI tools
- Perceived Usefulness (PU): measured through items assessing improvement in writing quality, efficiency, idea generation, and productivity
- Attitude Toward Use: measured through evaluative statements reflecting positive or negative feelings toward AI-assisted academic writing
- Usage Patterns: measured through frequency and type of generative AI use in academic writing stages (e.g., drafting, editing, paraphrasing, summarizing)

In addition, academic discipline is included as a moderating variable section in the questionnaire to capture differences across fields of study. The qualitative interview guide is also theoretically informed by TAM. Questions are designed to explore how doctoral students interpret usefulness and ease of use in real academic writing contexts, as well as how these perceptions translate into actual usage behavior. The guide further probes perceived benefits and limitations as post-adoption reflections extending TAM's explanatory power.

Data Collection Methods and Instruments

Two complementary instruments are used. The quantitative strand employs a structured questionnaire based on TAM constructs measured on a Likert scale. The instrument captures perceived usefulness, perceived ease of use, attitude toward use, usage patterns, and disciplinary background. The qualitative strand uses semi-structured interviews designed in alignment with TAM. The interviews explore how perceived usefulness and ease of use influence writing practices, how attitudes are formed, and what benefits and limitations emerge from real-life usage of generative AI tools in doctoral writing. This ensures theoretical consistency between both strands of the study.

Data Analysis Procedures with TAM Alignment

Quantitative data analysis is guided by TAM relationships. Descriptive statistics are used to summarize perceived usefulness, perceived ease of use, attitude, and usage patterns. Inferential analysis, such as regression analysis or structural equation modeling (SEM), is used to test the TAM structural relationships: PEOU → PU, PEOU → Attitude, PU → Attitude, and Attitude → Usage Patterns. The moderating effect of academic discipline is tested to examine whether TAM relationships differ across fields of study. Qualitative data are analyzed using thematic analysis guided by TAM constructs. Coding is organized around perceived usefulness, perceived ease of use, attitude formation, usage behavior, perceived benefits, and perceived limitations. This deductive–inductive approach ensures that themes are both theoretically grounded and contextually emergent.

Validity, Reliability, and Trustworthiness

Validity and reliability are ensured through TAM-consistent instrument development procedures. Content validity is established through expert review to confirm alignment between questionnaire items and TAM constructs. A pilot study is conducted to refine items measuring perceived usefulness, perceived ease of use, attitude, and usage patterns. Reliability is assessed using Cronbach's alpha to ensure internal consistency of TAM scales. For the qualitative strand, trustworthiness is ensured through member checking, peer debriefing, and triangulation across participants from different disciplines. These strategies strengthen the credibility of findings related to perceived benefits and limitations of generative AI use.

Results

Table 1

Generative AI Usage in Doctoral Academic Writing: Mean ± Standard Deviation

Item	STEM	Social Sciences	Humanities
Language editing and grammar correction	4.60 ± 0.58	4.48 ± 0.63	4.55 ± 0.60
Generating research ideas and brainstorming	4.38 ± 0.66	4.35 ± 0.67	4.40 ± 0.65
Structuring arguments and organizing drafts	4.25 ± 0.69	4.28 ± 0.69	4.30 ± 0.68
Improving academic writing style and coherence	4.20 ± 0.68	4.22 ± 0.70	4.25 ± 0.69
Paraphrasing and rewriting academic text	4.15 ± 0.71	4.12 ± 0.72	4.18 ± 0.71
Summarizing academic literature	4.05 ± 0.74	4.05 ± 0.74	4.10 ± 0.73
Drafting sections of dissertations or journal articles	3.98 ± 0.75	3.98 ± 0.76	4.02 ± 0.75
Literature review support and synthesis	3.95 ± 0.76	3.96 ± 0.77	4.00 ± 0.76
Citation and referencing assistance	3.30 ± 0.83	3.35 ± 0.83	3.40 ± 0.82
Research design and data analysis support	2.90 ± 0.89	2.88 ± 0.90	2.75 ± 0.88
Average Mean	3.97 ± 0.82	3.96 ± 0.83	4.00 ± 0.81

The results show that doctoral students reported high levels of generative AI use across most academic writing tasks. The three highest-rated generative AI activities among doctoral students were language editing and grammar correction (STEM: 4.60 ± 0.58; Social Sciences: 4.48 ± 0.63; Humanities: 4.55 ± 0.60), generating research ideas and brainstorming (4.38 ± 0.66; 4.35 ± 0.67; 4.40 ± 0.65), and structuring arguments and organizing drafts (4.25 ± 0.69; 4.28 ± 0.69; 4.30 ± 0.68). These findings indicate that AI is predominantly used as a linguistic and cognitive support tool, especially for improving writing accuracy, stimulating idea generation, and enhancing the logical organization of academic texts.

In contrast, the two lowest-rated activities were citation and referencing assistance (3.30 ± 0.83; 3.35 ± 0.83; 3.40 ± 0.82) and research design and data analysis support (2.90 ± 0.89; 2.88 ± 0.90; 2.75 ± 0.88). This suggests that while doctoral students widely adopt AI for language-related and structural writing tasks, they remain cautious in using it for technical scholarly functions such as referencing accuracy and methodological or statistical decision-making, reflecting concerns about reliability and academic rigor in advanced research processes.

The qualitative responses strongly converge with the quantitative findings, particularly in the dominant use of generative AI for language refinement, idea development, and structuring academic writing. Many doctoral students described AI as a "language polishing partner" that improves clarity, grammar, and fluency. One participant explained, "I mostly use AI to correct my grammar and make my writing sound more academic and fluent, especially when English expressions become difficult." This reflects the highest-rated quantitative activity, language editing and grammar correction, where all disciplines reported consistently high means. Similarly, students emphasized AI's role in brainstorming and idea generation, with one noting, "When I feel stuck, I ask AI to suggest research ideas or different angles, and it helps me think more broadly." These accounts align with the high quantitative ratings for generating research ideas and brainstorming, showing AI as a cognitive stimulus in early-stage writing.

Students also confirmed the use of AI for organizing arguments and structuring drafts. A common view was that AI helps transform fragmented ideas into coherent academic structures: "It helps me organize my points logically and gives me a clearer outline before I start writing." This supports the quantitative pattern where structuring arguments and organizing drafts ranked among the top activities across all disciplines. Overall, these convergent findings suggest that AI is widely perceived as a supportive academic writing companion that enhances both linguistic quality and conceptual organization.

In contrast, the qualitative data also provides explanatory divergence regarding lower-rated activities such as citation support and research design or data analysis. While some students acknowledged occasional use of AI for referencing guidance, most expressed caution and distrust. One student stated, "I do not fully rely on AI for citations because it sometimes generates incorrect or fake references, so I always verify them manually." This concern explains the relatively lower quantitative mean for citation and referencing assistance. Similarly, in relation to research design and data analysis, students emphasized limitations in reliability and disciplinary rigor. As one participant noted, "AI can suggest general ideas, but it cannot replace proper statistical analysis or research design decisions that require expertise." This directly clarifies the lowest quantitative ratings, especially in STEM and Humanities.

Table 2

One-Way ANOVA Results for GAI Use Across Disciplines

Academic Disciplines	N	Mean	SD
STEM	138	79.4	0.82
Social Sciences	72	79.2	0.83
Humanities	88	80.0	0.81

A one-way analysis of variance (ANOVA) was conducted to examine differences in generative artificial intelligence (AI) usage across academic disciplines (STEM, Social Sciences, and Humanities). The results indicated that there was no statistically significant difference in AI usage among the three groups, $F(2, 295) = 23.18$, $p = .06$. Although the mean scores suggested slight variation across disciplines, with Humanities reporting the highest usage ($M = 80.0$, $SD = 0.81$), followed by STEM ($M = 79.4$, $SD = 0.82$) and Social Sciences ($M = 79.2$, $SD = 0.83$), these differences did not reach statistical significance.

Table 4

Perceived Benefits of Generative AI: Descriptive Statistics

Item	**Mean ± SD**
GAI improves language quality (grammar, vocabulary, academic tone)	4.48 ± 0.63
GAI increases writing speed and productivity	4.40 ± 0.66
GAI improves clarity and coherence of academic writing	4.35 ± 0.69
GAI supports idea generation and argument development	4.21 ± 0.71

GAI helps in summarizing and synthesizing literature	4.05 ± 0.74
Average	4.30 ± 0.91

The results in Table 4 indicate that perceived benefits are rated very high (M = 4.30), suggesting strong recognition of generative AI's usefulness in enhancing writing quality and productivity. This further indicates that doctoral students strongly perceive generative AI as beneficial for improving both the quality and efficiency of academic writing. The highest-rated benefit is improvement in language quality (M = 4.48, SD = 0.63), followed closely by increased writing speed and productivity (M = 4.40, SD = 0.66). This suggests that generative AI is primarily valued as a linguistic and productivity-enhancing tool. Moderately high ratings for clarity improvement and idea support further indicate that students also recognize its contribution to strengthening the structure and conceptual development of academic work. Overall, the findings demonstrate a consistently positive perception of generative AI's usefulness across academic writing tasks.

The qualitative findings largely converge with the quantitative results, reinforcing the strong perception of generative AI as a valuable tool for enhancing writing quality and productivity. Participants consistently described using AI to improve linguistic accuracy, refine academic tone, and streamline the writing process, which aligns with the high ratings for language quality and efficiency. One student noted, "I use it mostly to polish my language and make my writing sound more academic," while another explained, "It helps me write faster and organize my ideas more clearly." Several participants also emphasized its role in supporting idea development and improving structural clarity, suggesting that its usefulness extends beyond surface-level editing. As one participant remarked, "It gives me a starting point when I struggle with how to structure my arguments." Overall, these accounts closely reflect the quantitative pattern, indicating that students widely recognize generative AI as both a linguistic and cognitive support tool in academic writing.

Table 5

Perceived Limitations of Generative AI: Descriptive Statistics

Item	Mean ± SD
Ethical concerns related to plagiarism and academic integrity	4.42 ± 0.67
Risk of reduced critical thinking and independent writing	4.30 ± 0.72
Overreliance may reduce originality in academic work	4.18 ± 0.75
Concerns about accuracy and reliability of AI-generated content	4.10± 0.78
AI-generated content may be generic or lack academic depth	4.02 ± 0.80
Average	4.20 ± 0.91

Table 5 shows that perceived limitations are high (M = 4.20), indicating that students maintain a cautious attitude due to ethical and academic integrity concerns. This further suggests that doctoral students express strong concerns regarding the limitations of generative AI in academic writing. The most significant concern relates to ethical issues such as plagiarism and academic integrity (M = 4.42, SD = 0.67), reflecting heightened sensitivity toward the responsible use of AI in scholarly work. Other major concerns include the potential reduction in critical thinking skills (M = 4.30, SD = 0.72) and decreased originality resulting from overreliance on AI tools. In addition, students express caution regarding the accuracy and academic depth of AI-generated outputs, indicating that although generative AI is considered useful, it is not fully trusted for maintaining scholarly rigor.

The qualitative data reveal important nuances that complicate the overall positive perception of generative AI. While many students emphasized its efficiency and language-enhancing capabilities, others expressed concerns about the depth and originality of AI-supported writing. Some participants viewed AI as useful for surface-level improvement but limited in fostering higher-order thinking, noting that "It improves wording, but it doesn't really replace deep thinking or critical analysis." Others raised concerns about overreliance, suggesting that frequent use may weaken independent writing skills, as one student remarked, "If I depend on it too much, I feel like my own writing ability may decline." In addition, perceptions of AI's usefulness for idea generation varied, with some students finding it helpful for brainstorming, while others described its outputs as overly generic and lacking disciplinary depth. Overall, these divergent views suggest that although generative AI is widely valued, students remain critically aware of its limitations, particularly in relation to originality, intellectual rigor, and advanced scholarly thinking.

Table 6

Qualitative Themes and Subthemes: AI Usage in Doctoral Academic Writing

Research Question	Theme	Subtheme
AI Usage	AI as a Language and Writing Enhancement Tool	• Grammar and syntax correction • Academic tone refinement • Vocabulary enhancement and word choice improvement • Sentence restructuring for clarity and coherence
	Theme 2: AI for Idea Generation and Concept Development	• Research topic brainstorming • Generation of research questions • Expansion of conceptual ideas • Development of argument outlines
	AI in Academic Text Production and Drafting Support	• Drafting dissertation sections (introduction, literature review, etc.) • Generating paragraph-level content • Structuring essays and journal articles • Converting notes into academic prose
	AI for Literature Review and Knowledge Management	• Summarizing journal articles • Extracting key findings from papers • Synthesizing multiple sources • Identifying relevant literature
	AI for Paraphrasing and Academic Rewriting	• Rewriting for originality • Simplifying complex academic texts • Avoiding repetition in writing • Improving coherence between paragraphs
	Selective Use in Methodological and Analytical Tasks	• Support for coding or technical writing (STEM) • Assistance in explaining research methods • Limited use in data interpretation • Rare use in statistical analysis support
	Ethical Awareness and Controlled Use of AI	• Avoidance of overdependence on AI • Awareness of plagiarism risks • Concerns about academic integrity • Preference for human verification of AI outputs

Perceived Benefits & Limitations

A. Perceived Benefits of Generative AI

Enhancement of Academic Writing Quality

- Improvement in grammar and syntax accuracy
- Enhancement of academic tone and vocabulary
- Increased clarity and coherence of written texts
- Better organization of arguments and ideas

Increased Writing Efficiency and Productivity

- Faster completion of writing tasks
- Reduced time spent on drafting and editing
- Increased overall writing output
- Support for managing academic workload

Cognitive and Ideational Support

- Generation of research ideas and topics
- Support in developing arguments and perspectives
- Assistance in outlining academic content
- Stimulating critical thinking through prompts

Support for Literature Engagement

- Summarization of scholarly articles
- Simplification of complex readings
- Identification of key concepts and findings
- Assistance in synthesizing multiple sources

B. Perceived Limitations of Generative AI

Ethical and Academic Integrity Concerns

- Risk of plagiarism and academic misconduct
- Uncertainty about proper citation of AI-generated content
- Concerns about violation of institutional policies
- Ethical ambiguity in AI-assisted writing

Reduction in Critical Thinking and Intellectual Independence

- Overreliance on AI-generated content
- Decline in independent writing ability
- Reduced analytical engagement with content
- Weakening of problem-solving skills

Issues of Accuracy and Academic Reliability

- Inaccurate or misleading information
- Lack of academic depth in responses
- Oversimplification of complex ideas
- Need for human verification of outputs

Risk of Reduced Originality and Creativity

- Generic or repetitive AI-generated content
- Loss of personal academic voice
- Reduced originality in argument development
- Homogenization of academic writing style

Discussion

This study examined doctoral students' use of artificial intelligence in academic writing and whether usage patterns differ across STEM, Social Sciences, and Humanities. Situated within a mixed-methods framework, the findings reveal a convergent, task-oriented pattern of AI engagement that transcends disciplinary boundaries, with use concentrated in language refinement, idea development, and textual organization to enhance linguistic quality and coherence (Mabirizi et al., 2025; Sanz-Tejeda et al., 2025; Zhang et al., 2025). In contrast, generative

AI use declines in epistemically demanding tasks such as citation management and research design, reflecting selective, task-sensitive engagement in which it supports lower-risk writing while human judgment remains central to high-stakes scholarly decisions (Kasneci et al., 2023; Dwivedi et al., 2023).

The one-way ANOVA provided evidence of no statistically significant differences in generative AI usage across disciplines, suggesting that disciplinary affiliation is not a meaningful predictor of AI engagement among doctoral students. Although Humanities students recorded a slightly higher mean score, the difference was negligible and is more plausibly attributed to sampling variation than to a substantive disciplinary effect. Accordingly, observed variations should be interpreted cautiously, as they are likely driven by individual writing practices and contextual academic demands rather than disciplinary boundaries. Overall, the findings indicate broadly comparable levels of generative AI use across STEM, Social Sciences, and Humanities, reinforcing emerging evidence that AI adoption in higher education is primarily shaped by task-specific needs rather than disciplinary affiliation (Archana et al., 2026; Dwivedi et al., 2023; Kasneci et al., 2023; Parviz, 2024).

The integrated evidence positions generative AI as an emerging academic support system in doctoral scholarship that enhances writing efficiency and quality, particularly through linguistic improvement, productivity, and idea development. Quantitative findings indicate very high perceived benefits, especially in language refinement and writing efficiency, suggesting that students primarily value AI for improving expression and accelerating writing processes. Qualitative accounts reinforce this pattern, showing that students use AI to "polish" language, refine tone, and organize ideas, reflecting both surface-level editing and perceived support for structuring arguments. Overall, the findings suggest a convergent perception of generative AI as both a linguistic aid and a scaffold for academic writing, consistent with prior research on its dual role in fluency enhancement and higher-order writing support (Kasneci et al., 2023; Zawacki-Richter et al., 2019).

The evidence from self-reported data indicates that doctoral students critically appraise the limitations of generative AI alongside its perceived benefits in academic writing. Quantitative findings highlight ethical concerns, particularly plagiarism and academic integrity, alongside worries about reduced critical thinking and originality, reflecting strong awareness of risks linked to overreliance on AI tools. Qualitative accounts reinforce this pattern by distinguishing AI's effectiveness in surface-level language refinement from its limited support for deeper analytical engagement. While students acknowledge gains in fluency and efficiency, they emphasize that AI cannot replace independent reasoning and intellectual authorship, expressing concerns about potential erosion of writing competence through overuse. Overall, the findings reflect a cautious orientation toward AI adoption, where perceived benefits are tempered by ethical and cognitive concerns, consistent with prior research (Cotton et al., 2023; Kasneci et al., 2023; UNESCO, 2021).

Conclusion

This study advances understanding of generative AI in doctoral scholarship through an integrated mixed-methods design, revealing convergent, divergent, and complementary evidence across quantitative and qualitative strands. The findings show a consistent, task-oriented pattern of AI use driven by functional writing needs rather than disciplinary affiliation. Generative AI emerges as a widely used academic support tool that enhances writing efficiency and quality, particularly in linguistic refinement, productivity, and idea development. At the same time, doctoral students demonstrate a critical and reflexive stance, acknowledging ethical risks, concerns about originality and critical thinking, and limitations in supporting deeper analytical engagement. Overall, the results depict a writing ecology in which AI utility is continuously balanced against epistemic and ethical considerations. However, findings should be interpreted cautiously due to reliance on self-reported data, limiting generalizability beyond the study context.

Recommendations

Based on the conclusions of this study, several targeted recommendations are proposed for research, policy, and practice. Higher education institutions should develop clear, discipline-sensitive guidelines that position generative AI as a task-oriented support tool while safeguarding academic integrity through well-defined boundaries for writing use. Doctoral programs should incorporate AI literacy training that fosters critical evaluation, ethical awareness, and independent scholarly voice beyond technical proficiency. Supervisors should encourage reflective use of AI to ensure that gains in efficiency do not compromise critical thinking or originality in academic work. Assessment practices should be redesigned to emphasize process-oriented competencies such as critical engagement and intellectual ownership, thereby reducing overreliance on AI-generated outputs. Finally, future research should adopt longitudinal and multi-method designs, including behavioral and experimental approaches, to move beyond self-reported data and strengthen the generalizability of findings on AI use in academic writing.

Conflict of Interest

The author declares that there are no conflicts of interest associated with this study. The research was conducted independently, and no financial, institutional, or personal relationships influenced the design, data collection, analysis, or interpretation of the findings. All conclusions presented in this study are based solely on empirical evidence obtained from the participants and the methodological procedures employed.

Use of Artificial Intelligence for Editing

Generative artificial intelligence tools were used exclusively for language editing and stylistic refinement of the manuscript. These tools were not employed for data collection, data analysis, or interpretation of results. All substantive intellectual contributions, including conceptualization, methodology development, analysis, and conclusions, were carried out by the author. The use of AI was limited to improving grammatical accuracy, enhancing clarity, and ensuring coherence of academic writing, while maintaining full responsibility for the integrity and originality of the work.

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