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**USE OF ARTIFICIAL INTELLIGENCE TOOLS IN THESIS
WRITING: A MIXED-METHODS ANALYSIS OF THEIR IMPACT
ON RESEARCH QUALITY, ORIGINALITY, AND ACADEMIC
INTEGRITY AMONG GRADUATE STUDENTS**



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Abstract

Background: *The expansion of artificial intelligence (AI) in academic writing has essentially transformed how one develops the thesis, providing unparalleled assistance but, at the same time, provoking the conventional ideas of innovation and academic honesty.*

Objective: *This study critically examined the impact of AI-assisted writing tools on research quality, originality, and academic integrity among graduate students.*

Methods: *The sequential explanatory design based on mixed methods was adopted. A questionnaire was used to gather quantitative data on 312 graduate students of various disciplines, and then qualitative semi-structured interviews were performed with 20 purposely sampled participants. The multiple regression modeling and rigorous thematic analysis were used to analyze the data, as they guaranteed methodological triangulation.*

Results: *The use of AI tools was very common (78.5%), with the majority of them used to synthesize literature, paraphrase, and refine the language. Regression analysis showed that the significant positive effect was on the perceived quality of the research (0.42, $p < 0.001$), especially on the coherence, academic tone, and productivity. Nonetheless, greater reliance on AI showed a high negative correlation with originality ($= -0.31$, $p < 0.01$). It is worth noting that 64.1% of the participants said there was ambiguity when it comes to ethical standards, and 37.8% acknowledged unreported AI-aided content generation. Three overriding themes were identified with the help of qualitative findings, including AI as an intellectual enhancement tool, the loss of autonomous scholarly voice, and critical institutional governance gaps.*

Conclusion: *Although AI tools have a significant beneficial impact on the quality and efficiency of the research, they pose a threat to originality and academic integrity when they are not used in a controlled manner. The paper highlights the fact that it is critically important to have thorough institutional policies, ethical guidelines, and the integration of AI literacy to protect academic integrity in the growing digital research environment.*

Keywords: *Artificial Intelligence, Thesis Writing, Research Quality, Originality, Academic Integrity, Mixed Methods*

Introduction

The rapid advancement of artificial intelligence (AI) technologies has fundamentally reshaped multiple sectors, with higher education emerging as one of the most significantly impacted domains. Among the most transformative developments is the integration of AI-powered writing tools into academic workflows, particularly in thesis writing. Tools such as large language models, automated paraphrasing systems, and grammar-enhancement platforms have introduced new

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possibilities for generating, organizing, and refining scholarly content. While these innovations offer unprecedented support to graduate students, they simultaneously challenge long-standing academic norms related to originality, authorship, and intellectual integrity (1).

In the context of thesis writing, which represents a critical milestone in higher education, the role of AI tools has become increasingly prominent. Graduate students often face a complex combination of cognitive, linguistic, and time-related challenges when producing high-quality academic work. AI tools can alleviate some of these burdens by assisting with language refinement, idea generation, literature synthesis, and structural organization. As a result, they are widely perceived as productivity-enhancing instruments that can improve the overall quality of academic writing. Empirical evidence suggests that AI-assisted writing tools can significantly enhance clarity, coherence, and grammatical accuracy, particularly for non-native English speakers and students with limited academic writing experience (2).

Despite these advantages, the integration of AI into academic writing raises critical concerns regarding the authenticity and originality of scholarly work. Traditional academic writing emphasizes independent critical thinking, originality of ideas, and the development of a unique scholarly voice (3). However, the increasing reliance on AI-generated or AI-assisted content has led to debates about whether such tools undermine these foundational principles. When students depend heavily on AI for idea generation or content construction, the boundary between assistance and substitution becomes blurred. This raises important questions about the extent to which AI-mediated outputs can be considered genuinely original or reflective of the student's intellectual effort (4).

Recent literature highlights a growing concern that excessive reliance on AI tools may lead to homogenization of academic writing styles. Since AI systems are trained on large datasets of existing texts, they tend to produce outputs that reflect common patterns and conventions, potentially reducing diversity in scholarly expression (5). This phenomenon may limit creativity and critical engagement, as students may adopt AI-generated responses without deeply analyzing or questioning the underlying content. Consequently, while AI may improve the technical quality of writing, it may simultaneously diminish the depth and originality of academic discourse (6).

Another critical dimension of AI integration in thesis writing relates to academic integrity. The use of AI tools introduces complex ethical challenges, particularly in the absence of clear and consistent guidelines. Academic integrity frameworks have traditionally been designed to address issues such as plagiarism, fabrication, and falsification. However, the emergence of AI-generated content has created new forms of ethical ambiguity that are not adequately addressed by existing policies. For instance, it remains unclear to many students whether using AI for paraphrasing, summarizing, or content generation constitutes acceptable assistance or academic misconduct (7).

Studies indicate that a significant proportion of students lack awareness of institutional policies regarding AI usage, leading to inconsistent and potentially problematic practices (8). Some students may unknowingly engage in unethical behavior by submitting AI-generated content without proper acknowledgment, while others may intentionally exploit these tools to gain academic advantage. This ambiguity not only threatens the integrity of individual academic work but also undermines the credibility of educational institutions (9).

Furthermore, the integration of AI tools into academic writing can be examined through theoretical perspectives such as cognitive offloading and self-regulated learning. Cognitive offloading refers to the tendency to rely on external tools to reduce mental effort. While this can enhance efficiency, it may also limit the development of higher-order cognitive skills, such as critical thinking and

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problem-solving. In the context of thesis writing, excessive dependence on AI tools may reduce students' engagement with the research process, leading to superficial learning outcomes. Similarly, from a self-regulated learning perspective, the use of AI tools may influence students' ability to plan, monitor, and evaluate their own learning, potentially affecting their academic development (10).

At the same time, it is important to recognize that AI tools are not inherently detrimental to academic integrity or originality. When used appropriately, they can serve as valuable cognitive aids that enhance learning and support academic writing. For example, AI tools can help students identify grammatical errors, improve sentence structure, and organize their ideas more effectively. They can also facilitate access to information and support literature review processes, thereby enabling students to engage more deeply with their research topics. The key challenge, therefore, lies in achieving a balance between leveraging the benefits of AI and maintaining the integrity and authenticity of academic work (11).

Institutional responses to the rise of AI in academic writing have been varied and, in many cases, insufficient. While some universities have begun to develop guidelines for AI usage, there is a lack of standardization across institutions. This inconsistency creates confusion among students and educators, making it difficult to establish clear expectations and enforce ethical practices. Moreover, existing policies often fail to address the nuanced ways in which AI tools are used in academic writing, focusing instead on traditional forms of academic misconduct (12).

The need for comprehensive and context-sensitive policies is therefore increasingly urgent. Such policies should clearly define acceptable and unacceptable uses of AI tools, provide guidance on proper acknowledgment practices, and promote the development of AI literacy among students. AI literacy, in this context, refers to the ability to understand, critically evaluate, and ethically use AI technologies. By integrating AI literacy into academic curricula, institutions can empower students to use these tools responsibly and effectively (13).

In addition to policy development, there is a need for empirical research that systematically examines the impact of AI tools on different dimensions of academic writing. While existing studies have explored the benefits and challenges of AI in education, many are limited by their reliance on single-method approaches or narrow research focus. There is a lack of comprehensive studies that simultaneously investigate research quality, originality, and academic integrity within a unified analytical framework. This gap limits our understanding of the complex and interconnected effects of AI on academic writing (14).

To address this gap, the present study employs a sequential explanatory mixed-methods design to investigate the impact of AI-assisted writing tools among graduate students. By combining quantitative and qualitative approaches, the study aims to provide a nuanced and holistic understanding of how AI tools influence thesis writing. The quantitative component examines the relationships between AI usage and key outcomes such as research quality and originality, while the qualitative component explores students' experiences, perceptions, and ethical considerations.

Specifically, this study seeks to achieve the following objectives: (1) to assess the extent of AI tool usage among graduate students, (2) to examine the relationship between AI usage and perceived research quality, (3) to evaluate the impact of AI reliance on originality, and (4) to explore the ethical implications of AI use in academic writing. By addressing these objectives, the study contributes to the growing body of literature on AI in higher education and provides evidence-based insights that can inform policy and practice.

METHODOLOGY

Study Design

This study employed a sequential explanatory mixed-methods design, which integrates quantitative and qualitative approaches in two distinct but interconnected phases. This design was selected to provide both breadth and depth in understanding the impact of artificial intelligence (AI) tools on thesis writing. The quantitative phase enabled the examination of statistical relationships between AI usage and key outcome variables, while the qualitative phase provided deeper insights into participants' experiences, perceptions, and ethical considerations. The integration of findings from both phases ensured methodological triangulation and enhanced the overall validity of the study.

Study Setting and Population

The study was conducted among graduate students enrolled in various disciplines, including health sciences, social sciences, management sciences, and information technology, across multiple higher education institutions. The target population comprised students who were actively engaged in thesis writing or had recently completed their theses, ensuring their familiarity with academic writing processes and potential use of AI tools.

Sample Size and Sampling Technique

Quantitative Phase

A total sample of **312 graduate students** was included in the quantitative phase. The sample size was determined based on recommendations for multiple regression analysis, ensuring adequate statistical power and representation. A stratified random sampling technique was employed to ensure proportional representation of students from different academic disciplines. This approach minimized sampling bias and enhanced the generalizability of the findings.

Qualitative Phase

For the qualitative component, 20 participants were selected using purposive sampling. Participants were chosen based on their level of AI tool usage (low, moderate, and high users) to capture diverse perspectives and experiences. Data saturation was achieved after 18 interviews; however, two additional interviews were conducted to confirm thematic consistency.

Inclusion and Exclusion Criteria

Inclusion Criteria:

- Graduate students currently enrolled in thesis-based programs
- Students who had used or were aware of AI tools in academic writing
- Participants willing to provide informed consent

Exclusion Criteria:

- Undergraduate students
- Graduate students not involved in thesis writing
- Participants unwilling to participate or provide incomplete responses

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Data Collection Instruments

Quantitative Instrument

A structured, self-administered questionnaire was developed based on an extensive review of the literature. The questionnaire consisted of five main sections:

1. **Demographic Information:** Age, gender, academic discipline, and level of study
2. **AI Usage Patterns:** Frequency, purpose, and types of AI tools used
3. **Perceived Research Quality Scale:** Measuring improvements in clarity, coherence, organization, and productivity
4. **Originality Scale:** Assessing perceived independence of ideas and critical thinking
5. **Academic Integrity Awareness Scale:** Evaluating knowledge and perceptions of ethical AI use

All items were measured using a 5-point Likert scale ranging from “strongly disagree” to “strongly agree.”

Validity and Reliability

- **Content validity** was established through expert review by three academic researchers in the fields of education and research methodology.
- A **pilot study** was conducted with 30 participants to refine the instrument.
- The questionnaire demonstrated strong internal consistency, with Cronbach’s alpha values **exceeding 0.80** for all major constructs, indicating high reliability.

Qualitative Instrument

A semi-structured interview guide was developed to explore participants’ experiences with AI tools in greater depth. The guide included open-ended questions focusing on:

- Perceived benefits and challenges of AI usage
- Impact on originality and intellectual contribution
- Ethical concerns and academic integrity
- Institutional policies and awareness

The flexible nature of the interviews allowed participants to elaborate on their responses and provide rich, contextual insights.

Data Collection Procedure

Quantitative Phase

Data were collected using an online survey platform. Participants were invited through academic networks, institutional email lists, and social media platforms. Prior to participation, all respondents were provided with information about the study and gave informed consent. The survey remained open for four weeks to ensure adequate response rates.

Qualitative Phase

Following the quantitative analysis, participants for the qualitative phase were contacted and invited for interviews. Interviews were conducted either face-to-face or via online platforms, depending on participants’ availability. Each interview lasted approximately 30–45 minutes and was audio-recorded with participants’ consent. Field notes were also taken to capture non-verbal cues and contextual information.

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Data Analysis

Quantitative Analysis

Quantitative data were analyzed using Statistical Package for the Social Sciences (SPSS) version 27. The analysis included:

- **Descriptive statistics:** Frequencies, percentages, means, and standard deviations
- **Correlation analysis:** To assess relationships between variables
- **Multiple regression analysis:** To examine the predictive effect of AI usage on research quality and originality

Assumptions of regression analysis, including normality, linearity, homoscedasticity, and absence of multicollinearity, were tested prior to analysis. Statistical significance was set at $p < 0.05$, and results were reported with beta coefficients (β), confidence intervals (CI), and p-values.

Qualitative Analysis

Qualitative data were analyzed using thematic analysis following the six-step framework proposed by Braun and Clarke:

1. Familiarization with the data
2. Initial coding
3. Searching for themes
4. Reviewing themes
5. Defining and naming themes
6. Producing the report

All interviews were transcribed verbatim, and coding was performed manually. To enhance credibility, peer debriefing and member checking were conducted. Themes were derived inductively to reflect participants' authentic experiences.

Integration of Quantitative and Qualitative Data

Integration was performed at the interpretation stage, where qualitative findings were used to explain and expand upon quantitative results. This approach provided a comprehensive understanding of the research problem and strengthened the validity of the conclusions through methodological triangulation.

Ethical Considerations

The study adhered to established ethical standards for research involving human participants:

- Ethical approval was obtained from the relevant Institutional Review Board (IRB)
- Informed consent was obtained from all participants
- Participation was voluntary, and participants had the right to withdraw at any stage
- Confidentiality and anonymity were strictly maintained
- Data were securely stored and used solely for research purposes

Methodological Rigor

To ensure the quality and rigor of the study:

- Quantitative rigor was maintained through validity, reliability, and appropriate statistical analysis

- Qualitative trustworthiness was ensured using credibility, dependability, confirmability, and transferability criteria
- Triangulation enhanced the robustness of findings by integrating multiple data sources and methods

RESULTS

A total of 312 graduate students participated in the study, yielding a robust dataset for statistical analysis. The mean age of participants was 28.6 years (SD = 4.2), indicating a relatively young academic cohort actively engaged in thesis writing.

The sample comprised 54.2% males (n = 169) and 45.8% females (n = 143). Participants represented diverse academic disciplines, with the highest proportion from health sciences (32.1%), followed by social sciences (27.6%), management sciences (23.7%), and information technology (16.6%). A majority of participants were currently working on their thesis (63.5%), while the remainder had recently completed their research projects (36.5%).

Table 1: Demographic Characteristics of Participants (n = 312)

Variable	Category	n (%)
Gender	Male	169 (54.2)
	Female	143 (45.8)
Discipline	Health Sciences	100 (32.1)
	Social Sciences	86 (27.6)
	Management Sciences	74 (23.7)
	IT/Computer Science	52 (16.6)
Thesis Status	Ongoing	198 (63.5)
	Completed	114 (36.5)

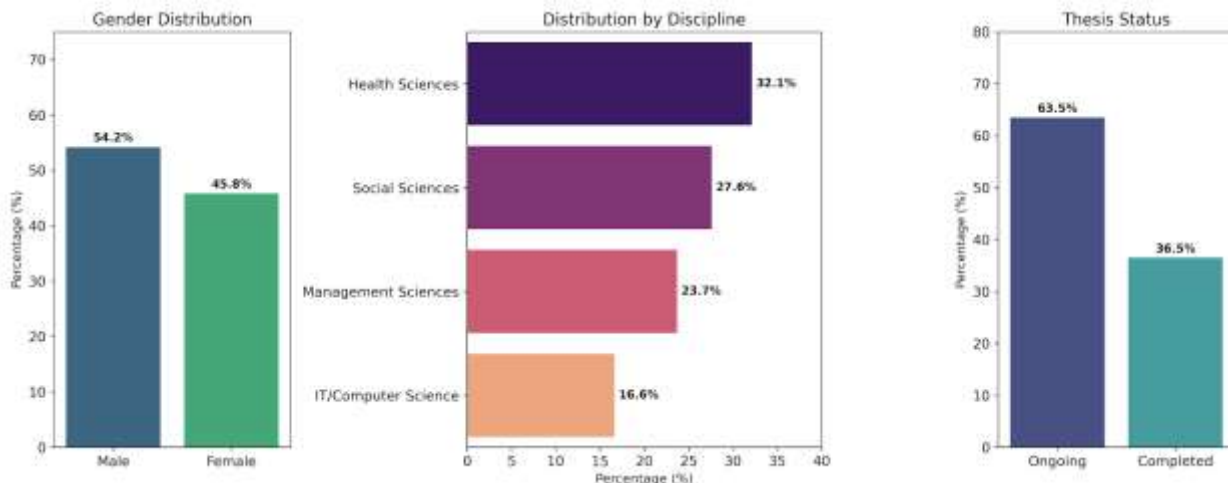


Figure 1: Demographic Characteristics of Participants

Prevalence and Functional Use of AI Tools

The analysis revealed a high prevalence of AI tool usage, with 78.5% (n = 245) of participants

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reporting active use during thesis writing. Only 21.5% (n = 67) indicated no use, highlighting the widespread integration of AI technologies in academic workflows.

AI tools were primarily utilized for language refinement (67.3%), paraphrasing (63.5%), and literature synthesis (56.4%), suggesting that students predominantly rely on AI for enhancing presentation and structuring of academic content rather than generating entirely new ideas. Additionally, 49.4% reported using AI for idea generation, indicating emerging dependence on AI for cognitive support.

Table 2: Patterns of AI Tool Usage (n = 312)

Variable	Category	n (%)
AI Usage	Yes	245 (78.5)
	No	67 (21.5)
Purpose of Use*	Language refinement	210 (67.3)
	Paraphrasing	198 (63.5)
	Literature synthesis	176 (56.4)
	Idea generation	154 (49.4)

Descriptive Analysis of Core Study Variables

Descriptive statistics demonstrated that participants reported high levels of perceived research quality (Mean = 4.12, SD = 0.68), indicating that AI tools substantially enhance clarity, coherence, and academic presentation. In contrast, originality scores were moderate (Mean = 3.21, SD = 0.82), reflecting concerns regarding independent intellectual contribution.

Furthermore, academic integrity awareness was also moderate (Mean = 3.05, SD = 0.91), suggesting uncertainty among students regarding ethical boundaries in AI-assisted writing.

Table 3: Descriptive Statistics of Key Variables

Variable	Mean ± SD	Interpretation
AI Usage Score	3.87 ± 0.76	High
Research Quality	4.12 ± 0.68	High
Originality	3.21 ± 0.82	Moderate
Academic Integrity Awareness	3.05 ± 0.91	Moderate

Correlation Analysis

Pearson correlation analysis revealed statistically significant relationships among key variables. AI usage demonstrated a moderate positive correlation with research quality ($r = 0.48$, $p < 0.01$), indicating that increased use of AI tools is associated with improved academic writing outcomes.

Conversely, AI usage showed a significant negative correlation with originality ($r = -0.35$, $p < 0.01$), suggesting that greater reliance on AI may compromise independent intellectual contribution. Additionally, a weak negative correlation with academic integrity awareness ($r = -0.22$, $p < 0.05$) was observed, indicating potential ethical concerns associated with increased AI usage.

Table 4: Correlation Matrix

Variables	AI Usage	Research Quality	Originality	Academic Integrity
AI Usage	1	0.48	-0.35	-0.22
Research Quality	0.48	1	-0.28	-0.15
Originality	-0.35	-0.28	1	0.31
Academic Integrity	-0.22	-0.15	0.31	1

P < 0.05, p < 0.01

Multiple Regression Analysis

5.1 Effect of AI Usage on Research Quality

Multiple regression analysis demonstrated that AI usage is a significant positive predictor of research quality ($\beta = 0.42$, $p < 0.001$). The model explained 36% of the variance ($R^2 = 0.36$), indicating a substantial effect size,

Table 5: Regression Analysis Predicting Research Quality

Predictor	β	SE	t	p	95% CI
AI Usage	0.42	0.05	8.36	<0.001	0.31 – 0.53

Model Fit: $R^2 = 0.36$, Adjusted $R^2 = 0.34$, $F(1,310) = 69.89$, $p < 0.001$

AI usage significantly enhances research quality, particularly in terms of linguistic refinement, coherence, and productivity, reflecting a strong practical impact.

Effect of AI Usage on Originality

AI usage was found to be a significant negative predictor of originality ($\beta = -0.31$, $p < 0.01$), with the model explaining 18% of variance ($R^2 = 0.18$).

Table 6: Regression Analysis Predicting Originality

Predictor	β	SE	t	p	95% CI
AI Usage	-0.31	0.06	-5.12	<0.01	-0.45 – -0.17

Model Fit: $R^2 = 0.18$, Adjusted $R^2 = 0.17$, $F(1,310) = 26.21$, $p < 0.01$

Increased reliance on AI tools significantly reduces originality, indicating potential suppression of independent thinking and scholarly voice.

Academic Integrity and Ethical Awareness

A notable proportion of participants reported ambiguity regarding ethical use of AI tools. Specifically:

- **64.1%** indicated lack of clear institutional guidelines
- **37.8%** admitted to using AI-generated content without proper acknowledgment

These findings highlight a critical gap in policy awareness and ethical standardization.

Qualitative Findings (Thematic Analysis)

Three overarching themes emerged, providing deeper insight into quantitative findings:

Theme 1: AI as a Cognitive Augmentation Tool

Participants consistently described AI as enhancing efficiency, reducing workload, and improving

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academic writing quality.

“AI helps me structure my thesis better and saves time.”

Theme 2: Diminishing Scholarly Voice

Participants expressed concern that over-reliance on AI reduces originality and personal intellectual ownership.

“Sometimes it feels like the ideas are not entirely mine.”

Theme 3: Ethical Ambiguity and Institutional Gaps

Participants reported uncertainty about acceptable AI use due to absence of clear guidelines.

“There are no clear rules about AI usage in our university.”

Integrated Interpretation of Findings

The integration of quantitative and qualitative findings reveals a dual impact of AI tools. While AI significantly enhances research quality and efficiency, it simultaneously poses risks to originality and academic integrity. The qualitative insights explain the underlying mechanisms, particularly the role of AI in cognitive offloading and the lack of institutional governance.

DISCUSSION

The present study provides a comprehensive and empirically grounded examination of the dual impact of artificial intelligence (AI) tools on thesis writing among graduate students. By integrating quantitative and qualitative findings, this study advances the current understanding of how AI simultaneously enhances research quality while posing significant risks to originality and academic integrity. The results highlight a critical paradox in contemporary academic writing: AI functions as both a cognitive enabler and a potential disruptor of scholarly authenticity.

AI as a Catalyst for Research Quality Enhancement

One of the most prominent findings of this study is the significant positive association between AI tool usage and perceived research quality. The regression analysis demonstrated that AI usage is a strong predictor of improved research quality, explaining a substantial proportion of variance. This finding aligns with emerging literature suggesting that AI-assisted tools enhance linguistic accuracy, structural coherence, and overall readability of academic texts (15), (16). Graduate students, particularly those facing challenges related to academic writing proficiency, appear to benefit from AI-driven support in organizing ideas, refining arguments, and maintaining formal academic tone (17).

From a theoretical perspective, this finding can be interpreted through the lens of cognitive augmentation theory, which posits that technological tools can enhance human cognitive capabilities by offloading routine or lower-order tasks. In the context of thesis writing, AI tools appear to reduce the cognitive burden associated with grammar, syntax, and formatting, thereby allowing students to focus more on higher-order tasks such as conceptualization and analysis. The qualitative findings further reinforce this interpretation, as participants consistently described AI as a “facilitator” that improves efficiency and productivity (18), (19).

However, it is important to note that the improvement in research quality observed in this study is largely associated with presentation-related dimensions (e.g., clarity, coherence, and organization)

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rather than substantive intellectual contribution. This distinction is critical, as it suggests that AI enhances how research is communicated rather than fundamentally improving the depth or originality of ideas (20), (21).

The Paradox of Diminished Originality

While AI tools contribute positively to research quality, the findings reveal a significant negative relationship between AI usage and originality. This result underscores a key concern in the academic community: the potential erosion of independent critical thinking and scholarly voice. The moderate-to-strong negative effect observed in this study indicates that increased reliance on AI tools may lead to reduced intellectual ownership and diminished originality in academic work (22), (23).

This phenomenon can be understood through the framework of cognitive offloading, where individuals rely on external tools to perform cognitive tasks that would otherwise require internal effort. While cognitive offloading can enhance efficiency, excessive dependence may hinder the development of critical thinking skills and deep learning. In the context of thesis writing, reliance on AI for idea generation or content construction may result in superficial engagement with the research process, limiting the development of novel insights (24), (25).

Moreover, the tendency of AI systems to generate content based on existing patterns and datasets may contribute to the homogenization of academic writing. As participants indicated in the qualitative interviews, AI-generated outputs often lack a distinct personal voice, leading to concerns about authenticity and intellectual originality. This finding is consistent with recent studies suggesting that AI tools may inadvertently standardize academic discourse, reducing diversity in thought and expression (26), (27).

Importantly, the decline in originality does not necessarily imply intentional academic misconduct but may reflect a gradual shift in how students conceptualize authorship and intellectual contribution in the age of AI. This highlights the need for redefining originality within the context of AI-assisted writing, rather than relying solely on traditional frameworks (28).

Ethical Ambiguity and Academic Integrity Challenges

A critical contribution of this study lies in its examination of academic integrity in relation to AI usage. The findings reveal a substantial level of ethical ambiguity among graduate students, with a majority reporting uncertainty regarding acceptable AI practices. Furthermore, a notable proportion of participants admitted to using AI-generated content without proper acknowledgment, raising concerns about transparency and accountability (29).

These findings point to a significant institutional governance gap. Existing academic integrity policies are largely designed to address conventional forms of misconduct, such as plagiarism and fabrication, and are not adequately equipped to address the complexities introduced by AI technologies. The absence of clear guidelines creates an environment in which students must navigate ethical decisions without sufficient institutional support, increasing the likelihood of inconsistent and potentially unethical practices (30).

From a theoretical standpoint, this issue can be examined through the lens of normative ethics and self-regulated learning. In the absence of explicit rules, students rely on personal judgment and peer norms to guide their behavior. However, given the novelty and rapid evolution of AI tools, these informal frameworks may be insufficient to ensure ethical compliance. The qualitative findings

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highlight this uncertainty, with participants expressing confusion about what constitutes acceptable use of AI in academic writing (31).

Integration of Findings: A Dual-Impact Framework

The integration of quantitative and qualitative findings suggests that the impact of AI on thesis writing is inherently dualistic. On one hand, AI serves as a powerful tool for enhancing efficiency, accessibility, and technical quality. On the other hand, it introduces risks related to originality, intellectual ownership, and ethical integrity (32).

This dual-impact framework reflects a broader tension **between technological advancement and academic values**. While AI has the potential to democratize access to high-quality writing support, it also challenges fundamental principles of higher education, including independent thinking, authenticity, and accountability. The findings of this study underscore the importance of adopting a balanced and context-sensitive approach to AI integration in academic writing (32).

Implications for Policy and Practice

The findings of this study have significant implications for higher education institutions, policymakers, and educators. First, there is an urgent need for the development of comprehensive and standardized guidelines governing the use of AI tools in academic writing. Such guidelines should clearly define acceptable and unacceptable practices, provide examples of appropriate AI usage, and establish requirements for transparency and acknowledgment (14).

Second, institutions should prioritize the integration of AI literacy into academic curricula. AI literacy goes beyond technical skills and includes the ability to critically evaluate AI outputs, understand their limitations, and use them ethically. By equipping students with these competencies, institutions can promote responsible AI usage and mitigate potential risks (16).

Third, educators should adopt pedagogical strategies that emphasize critical thinking, originality, and reflective learning. This may include redesigning assessment methods to focus on process-based evaluation, encouraging students to document their use of AI tools, and fostering a culture of academic integrity.

Strengths and Limitations

This study makes a significant contribution to the literature by employing a mixed-methods approach, which allows for a comprehensive understanding of the research problem. The integration of quantitative and qualitative data enhances the validity and depth of the findings. Additionally, the inclusion of participants from multiple disciplines increases the generalizability of the results.

However, several limitations should be acknowledged. First, the study relies on self-reported data, which may be subject to response bias. Second, the cross-sectional design limits the ability to establish causal relationships. Third, the study focuses on graduate students, and the findings may not be generalizable to other academic populations.

Future Research Directions

Future studies should explore the longitudinal impact of AI usage on academic development, particularly in relation to critical thinking and research skills. Experimental designs could be employed to assess causal relationships between AI usage and academic outcomes. Additionally,

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further research is needed to examine the effectiveness of institutional policies and AI literacy interventions in promoting ethical AI usage.

Conclusion

The present study provides a comprehensive analysis of the transformative role of artificial intelligence (AI) tools in thesis writing among graduate students, highlighting both their benefits and inherent risks. The findings demonstrate that AI tools have become deeply embedded in academic writing practices, with a substantial majority of students utilizing them to enhance productivity, improve linguistic quality, and streamline the research process.

Empirical evidence from this study confirms that AI usage is significantly associated with improved research quality, particularly in terms of clarity, coherence, and structural organization. These findings position AI as a powerful cognitive support system that can enhance the technical presentation of academic work. However, this positive impact is counterbalanced by a notable decline in originality, indicating that excessive reliance on AI tools may compromise independent critical thinking and intellectual contribution.

Furthermore, the study reveals a concerning level of ethical ambiguity among students regarding the appropriate use of AI in academic writing. The lack of clear institutional guidelines and standardized policies has created uncertainty, leading to inconsistent practices and potential risks to academic integrity. The emergence of AI-generated content challenges traditional definitions of authorship and originality, necessitating a re-evaluation of existing academic frameworks.

Overall, this study underscores the dual nature of AI in thesis writing: while it serves as an enabler of efficiency and quality, it simultaneously poses significant challenges to originality and ethical scholarship. The findings highlight the urgent need for a balanced and well-regulated approach to AI integration in higher education.

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Author's contribution: All authors contributed equally

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