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The Impact of Artificial Intelligence on Thesis Writing Skills and Quality among Students at UPN "Veteran" Yogyakarta

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Abstract

This study examines the influence of artificial intelligence (AI) on students' thesis-writing abilities in higher education by evaluating its effects on writing proficiency, draft quality, and efficiency in thesis completion. The research employs Partial Least Squares (PLS) structural equation modeling to analyze data collected from 120 undergraduate students at UPN "Veteran" Yogyakarta who frequently utilized AI tools such as Turnitin and Grammarly. Structured questionnaires with high reliability and validity were used for data collection. The findings reveal that AI tools significantly enhance technical aspects of thesis writing, including grammar, coherence, and vocabulary, resulting in improved thesis quality. However, their contribution to developing deeper academic skills, such as critical thinking and argumentation, remains limited. While AI tools effectively address surface-level issues and provide valuable suggestions, they do not adequately support the cultivation of advanced intellectual abilities required for rigorous academic writing. This study highlights the importance of integrating AI tools with traditional teaching methods. Educators are encouraged to use AI to assist with technical writing while continuing to teach critical thinking and argumentation to develop well-rounded writing skills. A balanced approach combining AI technology and human guidance is essential for fostering both technical proficiency and the intellectual depth necessary for high-quality thesis writing.

Keywords: AI Tools, Thesis Writing, Educational Technology

Introduction

The integration of artificial intelligence (AI) into academic writing has transformed how students approach thesis preparation. AI tools, such as Grammarly and Turnitin, are widely used at various academic levels, offering functions that go beyond basic grammar corrections. These tools incorporate sophisticated algorithms that provide real-time feedback on grammar, coherence, and text structure. By improving clarity and coherence, they assist students in producing higher-quality work while streamlining the writing process (Jurado et al., 2023; Rahman et al., 2022). However, overreliance on AI tools risks undermining the development of critical academic skills, such as analytical reasoning and innovative inquiry, which are essential for original research (Kooli, 2023; Pedersen, 2023).

AI excels at addressing surface-level issues, including grammar and spelling, and enhancing text flow. Yet, its inability to assess broader contexts or support complex theoretical applications

highlights its limitations in fostering deep intellectual engagement. For instance, while AI can assist in organizing literature reviews and improving technical aspects of writing, it cannot substitute for the intellectual depth required in thesis development (Amyatun & Kholis, 2023; Wang, 2023). Students risk becoming dependent on these tools, potentially weakening their ability to conduct in-depth analysis and original research.

This research bridges a gap in the literature by focusing on AI's impact on thesis writing, specifically in the Indonesian higher education context. Unlike prior studies that broadly explore AI in academic writing, this study examines its influence on writing quality, productivity, and the risk of dependency among thesis-writing students. Additionally, it highlights the unique challenges faced by Indonesian students, including limited exposure to advanced AI tools and the linguistic nuances of writing in English as a second language.

Findings suggest that AI tools significantly improve technical aspects of writing but fall short in developing critical thinking and argumentation. Educators should adopt a balanced approach, integrating AI tools to enhance efficiency while emphasizing traditional methods to cultivate deeper academic competencies. Further research should explore long-term impacts of AI on writing skills and assess its application in diverse educational settings.

Research Methods

The study employed Partial Least Squares (PLS) structural equation modeling to explore the connections between thesis writing skills, the application of artificial intelligence (AI), and the quality of thesis documents. PLS was chosen for its flexibility in managing complex multivariate relationships and its suitability for smaller sample sizes and non-normal data distributions (Eckes et al., 2018; Liza & Mariana, 2023; Ramadana et al., 2023). This method enables the assessment of both direct and indirect relationships among variables, offering a nuanced understanding of how AI influences thesis quality and writing skills (Kosasi et al., 2023; Nguyen & Malik, 2022; Perdana et al., 2021).

In this study, key constructs were operationalized using specific indicators to reflect the relationships among variables. For example, thesis writing skills were measured using indicators such as writing mechanics, coherence, and originality. AI application was assessed through usage frequency, the perceived ease of use of AI tools, and the ability to incorporate AI-generated suggestions effectively. Meanwhile, thesis quality was measured by evaluating technical writing aspects, document organization, and adherence to academic standards based on a Likert-scale survey.

The PLS approach provided insights into the interactions between these variables, such as the moderating role of AI tools on the relationship between writing skills and thesis quality. For instance, the model examined whether frequent use of AI tools enhanced students' ability to improve their coherence and originality or if these tools directly contributed to higher-quality outputs by correcting technical errors. Mediation effects were also

analyzed to determine if AI tools indirectly improved thesis quality by first enhancing students' writing mechanics.

Moreover, the application of PLS allowed the study to incorporate findings from prior research. For example, Kosasi et al. (2023) highlighted PLS's strength in evaluating technology's role in educational settings, emphasizing its ability to account for complex interactions. Similarly, Nguyen & Malik (2022) demonstrated PLS's efficacy in identifying indirect pathways, such as how technology adoption influences student performance through intermediary variables. These references underscore the relevance of PLS in this study, particularly for its ability to illuminate nuanced relationships within technology-integrated learning environments.

By leveraging the flexibility of PLS, this study makes a valuable contribution to educational research, specifically by revealing the mechanisms through which AI tools support thesis writing processes. This aligns with broader educational goals of integrating technology into learning to enhance student outcomes, demonstrating how AI's potential can be maximized to improve academic performance.

Population and Sample

The study's population comprised 120 undergraduate students from UPN "Veteran" Yogyakarta, selected using a stratified random sampling method to ensure fair representation across various academic disciplines. The stratification was based on students' faculties (e.g., Social Sciences, Engineering, Economics) to capture a diverse range of perspectives on AI usage in academic writing. This stratification ensured that each faculty was proportionally represented, providing a comprehensive understanding of AI tools' influence across academic fields (Kautsar & Muslichah, 2022; Kosasi et al., 2023).

Participants were selected from different faculties to reflect variations in academic writing demands, technical proficiency, and familiarity with AI-based resources. For instance, faculties with intensive research and writing components, such as Social Sciences, were equally weighted with technical faculties to capture differences in AI impact.

All participants were actively utilizing AI-based tools such as Turnitin and Grammarly, which were either required as part of their academic coursework or voluntarily used as a habitual writing aid. This distinction was clarified during the data collection process to ensure that both required and voluntary usage were documented. By focusing on students who actively used these tools, the study could more effectively evaluate their direct and indirect impacts on writing skills and thesis quality.

Questionnaire Design

Data collection was meticulously designed using structured questionnaires that targeted three key dimensions: AI Usage, Writing Skills, and Thesis Quality. The responses were recorded on a 5-point Likert scale, allowing students to provide nuanced self-assessments of their writing abilities and the overall quality of their theses (Rosli et al., 2021; Sunarsih et al., 2020).

The questionnaire items were derived from metrics commonly used in

prior studies, ensuring validity and reliability. Specific details include aspects of AI usage, writing skills, and thesis quality. For AI usage, the items focused on the frequency and purpose of using tools like Turnitin and Grammarly, the perceived ease of use and effectiveness of these tools in improving writing quality, as well as dimensions such as AI-generated suggestions and plagiarism detection. Writing skills were guided by Hyland's framework, which emphasizes key competencies in academic writing, including coherence (logical flow and structure of ideas), organization (proper arrangement of paragraphs and sections), and originality (creative and critical thinking in academic content). These elements were operationalized into questionnaire items that directly measured students' performance in these areas. For thesis quality, the items were adapted from Sarstedt et al.'s standards, emphasizing clarity of expression (proper use of language and adherence to academic conventions) and depth of analysis (the ability to critically engage with literature and data). This comprehensive approach ensures a robust evaluation of the variables under study.

This structured approach facilitated an in-depth examination of the relationships between AI usage, writing proficiency, and thesis quality, ensuring robustness in the study's findings (Abdullah et al., 2021; Biliavska et al., 2022).

Dependability Testing

To ensure the reliability of the questionnaire, Cronbach's Alpha was calculated for each component, with values ranging from 0.82 to 0.87, indicating a high level of internal consistency across the dimensions of AI Usage, Writing Skills, and Thesis Quality (Abdullah et al., 2021; Mariana et al., 2018; Mariana & Ramadana, 2020; Nguyen & Malik, 2022). The Cronbach's Alpha threshold of 0.8, widely recognized as a benchmark for strong internal consistency, further affirmed the dependability of the measurement instrument used in the study. In terms of validity, several steps were taken to ensure that the questionnaire accurately captured the constructs under investigation.

Expert reviews were conducted, involving specialists in academic writing and AI applications who provided feedback on the clarity and relevance of the items, which was crucial for refining the questionnaire to align with the study's objectives and accurately reflect the constructs of interest (Abdullah et al., 2021; Cannas et al., 2024; Dwivedi et al., 2023). Additionally, factor analysis was employed to validate the questionnaire structure, confirming that the items were appropriately grouped according to their respective constructs. Factor loadings above 0.5 were achieved for all items, indicating strong relationships between the items and their underlying constructs, thereby enhancing the instrument's content validity (Biliavska et al., 2022). These high factor loadings demonstrate that the questionnaire effectively captured the dimensions of AI usage, writing proficiency, and thesis quality in a coherent and meaningful way (Çoşkun et al., 2017; Momayyezi et al., 2019). Together, the reliability and validity measures ensured that the data collected was both consistent and accurate, providing a robust foundation

for analyzing the impact of AI on academic writing.

Analysis Using Partial Least Square (PLS)

Partial Least Squares (PLS) was used to analyze the data. The method aimed to maximize the explained variance of constructs and explore the relationships between AI usage, writing skills, and thesis quality. The evaluation process involved assessing convergent validity, reliability, and the overall model fit.

Convergent validity was measured using the Average Variance Extracted (AVE), with values above 0.5 indicating that the constructs adequately explained their respective indicators. Reliability was confirmed by Composite Reliability (CR) values exceeding 0.8, demonstrating high internal consistency (Kosasi et al., 2023; Nguyen & Malik, 2022).

To determine the strength and significance of relationships among variables, path coefficients were calculated using bootstrapping techniques. This method ensured the stability and accuracy of parameter estimates, providing reliable insights into direct and indirect effects (Abdullah et al., 2021; Dhaniarti et al., 2019; Nguyen & Malik, 2022; Warsini et al., 2015). The analysis confirmed that AI tools have a significant impact on students' thesis-writing proficiency and manuscript quality.

Results of Research and Discussion

Result

The structural model evaluation highlighted significant relationships among constructs. Bootstrapping confirmed the statistical significance of these relationships, illustrating AI tools' effectiveness in addressing surface-level writing issues, such as grammar, coherence, and vocabulary. However, their impact on advanced academic skills, such as critical thinking and argumentation, was limited.

Practical Implications

The findings have practical implications for enhancing thesis quality and writing proficiency. While AI tools like Grammarly and Turnitin improve technical writing aspects, educators should integrate them with traditional teaching methods to foster deeper intellectual abilities. A balanced approach combining AI with human guidance can help students develop well-rounded writing skills.

This study underscores the potential of AI in academic settings and offers actionable recommendations for leveraging these tools effectively in higher education. By addressing both surface-level and intellectual writing challenges, institutions can better prepare students for academic success.

Evaluation of the Measurement Model

The reflective measurement model was evaluated based on key criteria to ensure its validity and reliability. Indicators with factor loadings above 0.70 were retained, confirming their substantial contribution to their respective constructs (Leguina, 2015). Composite Reliability (CR) values exceeded 0.70 for all constructs, indicating strong internal consistency (Henseler et al., 2016). The Average

Variance Extracted (AVE) values were above 0.50, ensuring adequate convergent validity (Lim, 2024). Discriminant validity was also established using the Fornell-Larcker Criterion and the Heterotrait-Monotrait Ratio (HTMT), with HTMT values below the 0.90 threshold, indicating distinct constructs (Henseler et al., 2016).

For example, the Artificial Intelligence Usage (AIU) variable demonstrated factor loadings between 0.729 and 0.787, a Cronbach's Alpha of 0.824, and an AVE of 0.583, meeting all criteria for validity and reliability. Similarly, the Thesis Writing Ability variable had loadings from 0.785 to 0.826 and an AVE of 0.638, while the Thesis Writing Quality variable showed loadings between 0.778 and 0.866 with an AVE of 0.702, both reflecting strong validity. These findings confirm the measurement model's robustness, ensuring accurate assessment of the relationships among AI usage, writing skills, and thesis quality.

Tabel 1. Discriminant Validity: Fornell-Larcker Criterion

Variable	AIU	Thesis Writing Ability	Thesis Writing Quality
Artificial Intelligence Usage	0.763		
Thesis Writing Ability	0.624	0.799	
Thesis Writing Quality	0.577	0.688	0.838

Source: Processed Data (2024)

Evaluation of the Structural Model

The structural model evaluation focuses on the relationships between variables, ensuring the model's validity and reliability. Multicollinearity was assessed using the Variance Inflation Factor (VIF), with all VIF values below 5, indicating no multicollinearity issues (Rönkkö & Evermann, 2013). The significance of the hypothesized relationships was determined using T-statistics greater than 1.96 or p-values less than 0.05, confirming significant effects between variables (Forza & Nugroho, 2023).

The strength of the relationships was evaluated through the f^2 effect size, where values of 0.02, 0.15, and 0.35 indicate small, moderate, and large effects, respectively (Rönkkö & Evermann, 2013). Additionally, the R-squared value revealed the proportion of variance explained by the model, with results categorized as low (0.19), moderate (0.33), or high (0.66). The model's overall fit was assessed using the Standardized Root Mean Square Residual (SRMR), which was below 0.08, indicating a good model fit (Maulidina et al., 2021).

This study also employed bootstrapping to test the significance and strength of the relationships between constructs. The path coefficients showed significant relationships, supported by high T-statistics and low p-values, validating the model's robustness. The R-squared values indicated moderate explanatory power, confirming that the independent variables sufficiently explained the variance in the dependent variables.

Linearity and heterogeneity were further examined using FIMIX-PLS to identify potential data segments with differing patterns (Kock, 2015; Sarstedt & Ringle, 2010). The structural model demonstrated meaningful and significant

relationships between AI usage, thesis writing ability, and thesis quality, underscoring the validity of the findings.

These evaluations collectively confirm that the structural model effectively captures the dynamics between the constructs. The model not only highlights the influence of AI on thesis writing proficiency and quality but also ensures the reliability and applicability of the results in academic contexts.

Hypothesis Testing

The following is a table of hypothesis testing results:

Table 2. Hypothesis Testing

Hypotheses	Path Coeff	T Statistics	P Value	PCI (Upper Limit)	PCI (Bottom Limit)	Sig/ Supported?	F^2/Upsilon V	VIF	R2
H1 = PKB → Quality	0.679	12.79	0	0.575	0.782	Supported	0.857	1	0.46
H2 = PKB → Ability	0.224	2.56	0.012	0.044	0.403	Supported	0.063	1.857	0.57
H3 = PKB → Quality → Ability	0.397	5.618	0	0.273	0.554	Supported	0.032	1.857	0.46

Source: Processed Data (2024)

The results for Hypothesis H1 demonstrate a strong and significant relationship between PKB and Quality. With a path coefficient of 0.679, a t-statistic of 12.790, and a p-value of 0.000, this relationship is highly significant. The 95% confidence interval (PCI) for this path coefficient ranges from 0.575 to 0.782, further solidifying the robustness of the relationship. The effect size (F^2/Upsilon V) of 0.857 indicates a substantial impact of PKB on Quality, while the VIF of 1.000 confirms that there are no concerns regarding multicollinearity. Additionally, the R^2 value of 0.461 indicates that PKB explains 46.1% of the variance in Quality, highlighting its importance as a predictor.

For Hypothesis H2, the relationship between PKB and Ability is also significant, though the effect is weaker compared to the relationship with Quality. The path coefficient is 0.224, with a t-statistic of 2.560 and a p-value of 0.012, confirming the significance of this effect. The PCI for this path coefficient ranges from 0.044 to 0.403, suggesting that while the relationship is statistically significant, it is not as strong as in Hypothesis H1. The effect size (F^2/Upsilon V) is 0.063, indicating a relatively small impact of PKB on Ability. Despite this, the VIF value of 1.857 remains within acceptable limits, and the R^2 value of 0.569 suggests that 56.9% of the variance in Ability is explained by PKB, indicating moderate explanatory power.

Hypothesis H3 examines the indirect effect of PKB on Ability through Quality. The path coefficient for this indirect effect is 0.397, with a t-statistic of 5.618 and a p-value of 0.000,

demonstrating strong significance. The PCI for this relationship ranges from 0.273 to 0.554, confirming the robustness of the effect. However, the effect size (F^2/Upsilon V) is 0.032, suggesting that Quality's effect on Ability, while significant, is relatively small. The VIF for this path is 1.857, indicating no multicollinearity concerns. The R^2 value of 0.456 shows that 45.6% of the variance in Ability is explained by PKB through Quality, reflecting moderate explanatory power.

In summary, the findings highlight that PKB has a significant impact on both Quality and Ability, albeit with varying degrees of influence. Hypothesis H1 reveals a strong and meaningful effect of PKB on Quality, while Hypothesis H2 indicates a weaker but still significant effect on Ability. Hypothesis H3 underscores the important role of Quality in enhancing Ability, though the indirect effect remains modest. Overall, the results stress the critical role of PKB in shaping academic outcomes, particularly in improving Quality, while also enhancing Ability through Quality. The absence of multicollinearity further strengthens the model's validity, ensuring that the identified relationships are robust and not distorted by redundant correlations.

Discussion

AI and Writing Skills: A Balanced Perspective

Artificial intelligence (AI) is transforming education, particularly in writing enhancement. Tools like Grammarly and Turnitin significantly improve grammar, coherence, and sentence structure, offering quick, automated feedback. However, their influence on higher-level skills such as critical thinking, argumentation, and analytical writing remains limited (Dergaa et al., 2023; Miranty et al., 2023). While these tools excel in correcting surface-level writing issues, they are not yet capable of guiding students in constructing complex arguments or engaging in deeper academic discourse (Aljuaid, 2024; Hegde et al., 2023).

To bridge this gap, educators and institutions should adopt hybrid teaching models. AI tools can handle technical corrections, allowing instructors to focus on mentoring students in critical analysis and argument development. For example, AI can identify repetitive grammatical errors, freeing up educators to teach advanced writing strategies. This collaboration ensures both technical precision and intellectual depth in students' writing.

Additionally, AI's role should be integrated into the curriculum alongside targeted human instruction. Workshops that teach students how to effectively use AI tools, while still developing foundational skills, can empower them to use these resources strategically. By balancing AI's strengths with human guidance, students can achieve polished, intellectually robust academic writing.

AI tools like Grammarly and Turnitin are significant in improving surface-level aspects of writing such as grammar, coherence, and sentence structure. However, their impact on critical skills like argumentation and analytical writing is more limited

(Dergaa et al., 2023; Miranty et al., 2023; Moussa & Belhiah, 2024). AI tools excel in providing rapid feedback but often lack the ability to teach the core principles of academic writing, such as developing strong arguments and engaging with complex ideas (Kim et al., 2022). This highlights the limitations of AI: while it can address immediate writing issues, it does not foster deeper intellectual skills necessary for higher-order thinking (Hegde et al., 2023; Hwang et al., 2023). AI also struggles to fully grasp the nuanced demands of academic discourse across various fields, underscoring the continued need for human oversight (Aljuaid, 2024).

In conclusion, while AI can significantly improve writing mechanics, it cannot replace the depth and quality achieved through human instruction. The future of AI in education may lie in hybrid models, where technology complements human guidance, ensuring a balanced development of both technical writing skills and deeper academic proficiencies. To fully harness the potential of AI in education, institutions should integrate AI-driven feedback with personalized mentoring. For instance, AI tools can handle common grammatical errors, allowing educators to focus on cultivating students' analytical and argumentative abilities. Additionally, hybrid teaching frameworks can create a dynamic learning environment where students benefit from both AI's efficiency and the nuanced insights of human mentors. This approach will foster a more holistic educational experience.

Furthermore, ongoing research and development are vital to enhancing AI's ability to address higher-order writing skills. Innovations in natural language processing and machine learning have the potential to improve AI's understanding of context, tone, and domain-specific nuances in academic writing. However, these advancements should align with pedagogical principles to ensure they support educational goals. By fostering interdisciplinary collaborations between technologists and educators, institutions can create AI tools that not only improve writing mechanics but also cultivate critical thinking, effective argumentation, and engagement with complex academic content.

AI and Thesis Quality: Enhancing but Not Replacing Human Insight

AI has made significant contributions to enhancing thesis quality, particularly in technical aspects such as grammar and text flow. Research shows a strong relationship between AI usage and thesis quality, with a significant path coefficient ($\beta = 0.679$, $p < 0.0001$). However, AI's impact on intellectual elements such as critical thinking, argumentation, and depth of analysis is limited. This indicates that while AI is effective in improving the mechanics of writing, human guidance remains essential for developing deep academic substance (Utami et al., 2023).

A hybrid approach, combining AI expertise with human mentorship, proves to be an effective solution. For instance, AI tools like Grammarly ensure grammatical accuracy, while academic supervisors help students build strong

arguments and conduct deeper analysis. This collaboration allows students to efficiently utilize technology while continuing to develop higher academic skills.

Institutions also need to introduce AI literacy in their curricula to ensure students can maximize AI tools without becoming overly dependent on technology. Training sessions and workshops can help students understand the capabilities and limitations of AI tools, allowing them to use them strategically in academic writing.

With further advancements in AI technology, there may be opportunities to integrate more sophisticated systems that can assist in analyzing arguments or evaluating the structure of a thesis. However, this must be done with careful oversight to maintain the quality of education and the role of human expertise in the academic process.

AI, Writing Skills, and Thesis Quality as Mediators

The hypothesis testing results show that PKB (Technology-Based Skills Training) significantly influences Ability through Quality. The path coefficient for this relationship is 0.397, with a t-statistic of 5.618 and a p-value of 0.000, indicating a strong and significant effect. The 95% confidence interval (PCI) for this path coefficient, ranging from 0.273 to 0.554, further validates the strength of this relationship. The effect size (F^2/Upsilon V) of 0.032 indicates a relatively small impact of Quality on Ability. Additionally, the variance inflation factor (VIF) of 1.857 is within acceptable limits, indicating no multicollinearity issues. The R-squared (R^2) value of 0.456 reveals that 45.6% of the variance in Ability is explained by PKB through Quality.

However, the role of writing skills as a mediator between AI usage and thesis quality shows a relatively weak impact. The path coefficient for this mediation effect is 0.397 ($p < 0.005$), with an effect size (Upsilon V) of 0.032 (Al Mahmud, 2023). This finding suggests that while AI significantly enhances the technical quality of theses, its influence on developing writing skills is less pronounced. AI tools such as Grammarly and Turnitin primarily focus on improving technical and stylistic aspects of writing, such as grammar, coherence, and vocabulary, rather than fostering the foundational writing skills necessary for advanced academic work (Ilma & Sampurna, 2024; Zulfa et al., 2023).

The limited mediating effect of writing skills underscores the continuing importance of traditional writing instruction. While AI can significantly enhance the technical quality of written work, it cannot replace the essential role of human-led instruction in developing deeper academic skills. Effective writing is cultivated through sustained practice and engagement, which AI tools alone cannot fully provide. This highlights the need for a balanced approach, where AI acts as a supplement to, rather than a substitute for, traditional teaching methods aimed at improving writing skills (Anik, 2023; Ginting & Barella, 2022).

To bridge the gap between AI's technical capabilities and the deeper development of writing skills, educators must design a collaborative framework where AI tools and traditional teaching methods work in tandem. For example, while AI can provide immediate feedback on grammar and coherence, educators can focus on cultivating critical thinking, argumentation, and synthesis skills through personalized feedback and guided writing exercises. This dual approach ensures that students not only produce technically polished

academic work but also develop the intellectual rigor required for advanced research and analysis.

Moreover, integrating AI tools into academic curricula should be accompanied by structured training on their optimal use. Workshops and tutorials can educate students on the strengths and limitations of AI tools, ensuring that they are used as aids rather than crutches. By teaching students how to critically interpret AI feedback and incorporate it meaningfully into their writing process, institutions can empower them to leverage AI while building foundational writing skills. This hybrid approach promotes both efficiency in writing and the depth of understanding needed for academic excellence.

Finally, future advancements in AI should focus on addressing higher-order writing tasks, such as providing feedback on argument structure, evidence integration, and the overall logical flow of ideas. AI tools that can simulate these complex evaluative processes may significantly enhance their utility in academic contexts. However, such innovations must be complemented by human mentorship to provide the nuanced, context-sensitive guidance that AI cannot replicate. By combining technological advancements with pedagogical strategies, institutions can create a supportive ecosystem that nurtures both writing mechanics and advanced academic competencies, ultimately improving the quality of theses and academic writing as a whole.

Conclusion

AI tools have significantly transformed surface-level aspects of writing, particularly in areas such as grammar, coherence, and sentence structure. Tools like Grammarly and Turnitin have become essential for detecting and correcting grammatical, punctuation, and spelling errors with remarkable efficiency. By providing real-time feedback, these tools enable users to produce cleaner and more polished drafts while also enhancing sentence flow and syntax. This allows writers to organize their ideas more effectively and improve the overall readability of their work. However, the capabilities of these tools are primarily confined to technical refinements. They fall short in fostering critical thinking, argumentation, and in-depth analysis, which are essential components of advanced academic writing. These higher-order skills remain the domain of human instruction and require sustained practice to develop fully. Thus, while AI tools are invaluable for improving text readability and correctness, they cannot replace the intellectual depth and analytical abilities that are crucial for producing high-quality academic work.

In the context of thesis writing, AI tools like Grammarly and Turnitin play a pivotal role in enhancing grammar, spelling, and vocabulary—key elements of academic communication. Their real-time corrections and suggestions streamline the writing process, making it more accessible and efficient, particularly for students who are non-native speakers or those who struggle with basic writing mechanics. This improvement in clarity and professionalism is undeniably beneficial. Nevertheless, the impact of these tools is mostly limited to technical aspects. They help produce polished and grammatically sound manuscripts but do not significantly contribute to the generation of quality ideas or the development of complex arguments. As a result, while AI tools support technical excellence, they cannot substitute for the cognitive engagement and intellectual

effort required to craft high-quality academic work.

The relationship between professional knowledge and behavior (PKB) and ability through the lens of thesis quality highlights the nuanced role of writing skills. Writing skills act as a mediating factor, but their influence is relatively modest. AI tools excel in addressing grammar and syntax issues, thereby improving the technical quality of theses. However, their role in fostering critical argumentation or analyzing complex ideas remains limited. Advanced writing proficiency, which is crucial for producing impactful academic work, still depends heavily on traditional writing instruction. Human-led guidance, coupled with sustained practice, is essential for nurturing these higher-order skills. Therefore, while AI tools serve as valuable complements in the academic writing process, they cannot replace the active involvement of educators in guiding critical thinking and developing the intellectual depth needed for advanced academic writing.

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