

THE ROLE OF CRITICAL THINKING IN THESIS WRITING SUPPORTED BY AI TOOLS

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ABSTRACT

The growing use of Artificial Intelligence (AI) in the academic writing process highlights the importance of Critical Thinking (CT). The research explores how students' levels of CT influence their use of AI tools in academic writing, focusing on 16 students in the English education master's program who have joined a writing community. Using a qualitative method, the research employed a CT test and structured interviews as instruments. Two students achieved the highest score (85), while one student obtained the lowest score (28). The results showed a two-sided attitude towards AI usage. On the positive side, students acknowledge that AI improved their grammar, vocabulary, and idea formation. On the negative side, there were generic responses, a lack of originality, and overdependence on AI tools. Notably, students with higher CT skills tended to use AI more strategically for brainstorming, outlining, and refining content. In contrast, students with lower CT skills relied on AI to generate content holistically and make final-stage revisions. The findings showed that critical thinking plays a mediating role in ensuring the effective use of AI tools in academic writing. The study highlights the integration of CT and AI tools to promote better academic writing products and cognitive engagement.

Keywords: Academic writing; Artificial Intelligence; Critical thinking; Higher education; Thesis writing

ABSTRAK

Meningkatnya penggunaan Artificial Intelligence (AI) dalam proses penulisan akademik menyoroti pentingnya berpikir kritis. Penelitian ini bertujuan mengeksplorasi bagaimana tingkat berpikir kritis mahasiswa memengaruhi penggunaan alat AI dalam penulisan akademik, dengan melibatkan 16 mahasiswa Program Magister Pendidikan Bahasa Inggris yang tergabung dalam sebuah komunitas menulis. Penelitian ini menggunakan metode kualitatif dengan instrumen berupa tes berpikir kritis dan wawancara terstruktur. Dua mahasiswa memperoleh skor tertinggi (85), sedangkan satu mahasiswa memperoleh skor terendah (28). Hasil penelitian menunjukkan adanya dua sisi dalam penggunaan AI. Di satu sisi, mahasiswa mengakui bahwa AI membantu meningkatkan tata bahasa, kosakata, dan pengembangan ide. Di sisi lain, penggunaan AI juga menghasilkan respons yang bersifat umum, kurangnya orisinalitas, serta ketergantungan yang berlebihan terhadap alat AI. Mahasiswa dengan kemampuan berpikir kritis yang lebih tinggi cenderung menggunakan AI secara lebih strategis, seperti untuk melakukan brainstorming, menyusun kerangka tulisan, dan menyempurnakan isi tulisan. Sebaliknya, mahasiswa dengan kemampuan berpikir kritis yang lebih rendah lebih bergantung pada AI untuk menghasilkan keseluruhan isi tulisan dan melakukan revisi pada tahap akhir. Temuan penelitian menunjukkan bahwa berpikir kritis berperan sebagai mediator dalam memastikan penggunaan AI yang efektif dalam penulisan akademik. Penelitian ini menekankan pentingnya integrasi berpikir kritis dan alat AI untuk menghasilkan karya tulis akademik yang lebih berkualitas serta meningkatkan keterlibatan kognitif mahasiswa.

Kata Kunci: Penulisan akademik; Kecerdasan Buatan; Berpikir kritis; Pendidikan tinggi; Penulisan tesis

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INTRODUCTION

The growing prevalence of Artificial Intelligence (AI) in educational contexts has prompted significant discourse regarding its potential and challenges, especially in academic writing. In the Indonesian higher education landscape, AI tools such as ChatGPT, QuillBot, and Essay Writer are increasingly employed to assist students in composing academic papers. The study by Anggarini et al. (2023) found both positive and negative perspectives, and AI assisted in generating ideas and structuring academic writing. Similarly, a study by Marzuki et al. (2023) found that AI can improve students' writing quality in practice. However, students may encounter repetitive patterns due to tools that hinder their emotional and creative development (Lin & Chen, 2024).

The current literature offers various perspectives on AI's role in academic writing. Van Niekerk et al. (2025) found that students use AI tools because they perceive them as useful, especially for streamlining writing tasks. Kim et al. (2024) found that the multifunctional support of AI, in the form of a tutor, peer, and co-writer, was very helpful. In addition, Wale and Kassahun (2024) write that AI tools offer to enhance students' writing in coherence, grammar, and vocabulary. Jin et al. (2025) described three stages of AI use in writing: supporting (checking grammar), developing (improving writing quality), and transforming (fostering motivation and CT).

Unfortunately, the advancement of AI as an assistive tool in writing cannot substitute for students' cognitive abilities, including their critical thinking (CT). The studies by Darwin et al. (2024) and Gerlich (2025) found that there is a risk of over-reliance on AI and a reduction in depth and originality, even in the absence of CT. The integration of CT instruction is requested by Walter (2024) and van den Berg and du Plessis (2023). In academic programs supported by AI, teachers' roles in helping students should be prioritized, with teachers responsible for using AI. In the Indonesian context, Darwin et al. (2024) reported that students who used AI in writing without CT generated poor academic work. In a different context, Shen and Teng (2024) found that reliance on AI may reduce learners' independence and critical engagement. Lin and Chen (2024) and Hong et al. (2024) also noted that students lacked an emotional connection and experienced reduced creativity when using AI without CT. Therefore, understanding how students use AI with critical thinking has become essential to ensuring that AI supports and the production of high-quality academic writing.

In this study, the participants focus on a writing community in an English Education Master's program. The participants were graduate students who shared the goal of completing their academic writing, namely their theses, by participating in a writing community organized by the program. Bojovic et al. (2024) stated that the writing community is a big part of the program, read, write, retreat. They claimed that writing retreats depart from the concept of writing community, which gives individuals an opportunity by providing a specific time and place for writing. The other study showed that writing communities consist of people who share space and information to achieve goals by fostering their writing productivity through understanding their self-efficacy and self-regulation (Vincent et al., 2023). Thus, it is necessary to explore how students in a writing community who share the same academic writing goals use AI tools in their writing thesis process.

Although the role of AI in education is becoming increasingly popular, there is a significant gap that must be addressed critically: how CT levels influence students' use of AI tools when writing a thesis. At the same time, some AI enables students to gain the benefits of scaffolding, which they can abuse without using reflective or evaluative judgment. This gap becomes a crucial question regarding the cognitive and ethical dimensions of AI-assisted writing.

To sum up, the researchers proposed to explore: (1) determining whether students with different levels of CT differ in their selection and use of AI tools, (2) analyzing how CT skills affect the integration of AI in the thesis writing process. The novelty of this study lies in its empirical focus on Indonesian Master's students and its comparative analysis of AI practice by CT level, areas that prior researchers have not sufficiently explored.

METHODS

Research design

The research used a qualitative approach to investigate the relationship between students' critical thinking levels and the use of Artificial Intelligence (AI) tools in the writing of the thesis. The qualitative research design was used to obtain in-depth information about students' experiences and perceptions when integrating AI tools into their academic writing process. This study highlights the role of the writing community program in the Master's program.

Research site and participants

The research participants are 16 graduate students from the Master of English Education program at a State Islamic University in Indonesia. It was selected through purposive sampling. The participants were chosen based on their active participation in thesis writing and involvement in the writing community program. In addition, two participants with the highest scores and two participants with the lowest scores were purposively selected for the interview phase. The participants varied in their critical thinking ability, an important aspect to examine when examining differences in the use of AI tools.

Data collection and analysis

In collecting the data, the researchers used two instruments: a critical thinking test and semi-structured interviews. A CT test drawn from Assessment Day Practice Aptitude Tests (AssessmentDay, 2016) offered a standardized, objective measure of students' abilities across five key areas: arguments, assumptions, deductions, interpreting information, and inferences. It consists of 86 statements, with a score of 1 for each question. The test was administered through Google Form. In addition, the semi-structured interview, adapted from Zulfa et al. (2023), allowed for a deeper exploration of students' personal experiences with AI tools. With 12 open-ended questions focused on tool types, applications, benefits, challenges, and impacts. The interview session was conducted via Zoom, with a duration of 30 minutes for each student.

In analyzing the data, researchers used the theory of Miles et al. (2020). It consists of data reduction, data presentation, and drawing conclusions. Data from the CT test were collected at several stages. In the first stage of the CT test, researchers collected the critical thinking score. Then, researchers identify both high- and low-critical thinkers among students. In the next stage, the results of the CT score were presented from highest to lowest. In the last one, the researcher selected participants with the highest CT scores based on the assessment results for the interview phase. This selection enabled an in-depth exploration of how students with different levels of critical thinking utilized AI tools in their academic writing.

The interview data also follow several stages. In the data reduction, researchers transcribed the interview audio recordings into written text. The transcription process enabled to organize, review, and select meaningful data that addressed the research questions. Next, in the data display stage, the two main themes are: the first is students' perceptions of using AI tools in thesis writing. It presents participants' perceptions of the benefits and challenges of AI in writing theses. The second theme concerns how students with high and low CT scores use AI in their theses. In the last stage, researchers concluded that students' use of AI tools in academic writing.

The use of two different data sources ensured the validity and reliability of the collected data, as it was cross-verified across different perspectives. This qualitative approach allowed the researchers to gain a comprehensive understanding of the complex relationship between critical thinking and AI in thesis writing. The study contributes to the body of knowledge by providing empirical evidence of the impact of cognitive student engagement on the use of AI in academic writing.

FINDINGS AND DISCUSSION

Findings

The findings indicate that students with high and low critical thinking (CT) skills did not differ substantially in the AI writing tools they used. Both groups commonly utilized AI tools to support their academic writing. However, the primary difference lay in the purpose and manner in which they used these tools rather than in the specific AI applications themselves. In addition, the findings revealed clear differences in how students integrated AI into their writing practices. Students with higher CT skills used AI strategically for brainstorming, organizing ideas, creating outlines, and refining their drafts while maintaining control over the writing process. In contrast, students with lower CT skills relied more heavily on AI to generate complete content and perform final-stage revisions. The following is the result of the critical thinking test.

Table 1. The result of Students' scores of the Critical Thinking Test

Rank	Score of the Test	Initial Students' Name
1	85	Student 3
2	85	Student 11
3	74	Student 9
4	70	Student 6
5	60	Student 2
6	58	Student 4
7	56	Student 16
8	53	Student 12
9	47	Student 7
10	44	Student 5
11	44	Student 13
12	38	Student 8
13	37	Student 15
14	35	Student 10
15	29	Student 1
16	28	Student 14

The CT test results revealed variations in the critical thinking abilities of Master's students in the English education program. The score ranged from 28 to 85, indicating differing levels of critical thinking competence among the participants. Based on these results, the two students who achieved the highest and lowest scores were purposely selected to participate in the interview section to gain a deeper understanding of how students at different levels of CT used AI tools in academic writing.

The Perceptions of Students to Use AI in Writing a Thesis

The use of AI tools for thesis writing elicited different perceptions among students. Most students viewed AI as a highly beneficial tool for thesis writing. Some students are worried about AI's potential drawbacks, over-reliance, and reduced critical thinking. The results indicated that students' perceptions of using AI in thesis writing fell into two categories: positive and negative, reflecting their individual experiences with AI for thesis writing.

The positive results

Students concurred that using AI for thesis writing helped them enhance their writing skills, particularly in topic development, error correction, and writing style. Students found that AI is beneficial for improving thesis writing. They mentioned that.

"There are many changes, such as initially it was difficult to find interesting topics; using AI immediately found the latest news that is suitable for research topics." (Student 14)

"Help correct the writing, as there are sometimes typos." (Student 1)

"So, I feel the difference, and it is good because the grammar is immediately good. Another reason is that the vocabulary is improving, and the student is using language suitable for academic writing (academic language). However, the disadvantage is that the language is monotonous because the robot section is monotonous, so we have to change the vocabulary. (Student 3)"

On the other hand, the use of AI can encourage students to be more creative by exposing them to new words and common writing patterns. While using AI for writing assistance, students may discover unfamiliar vocabulary and observe different sentence structures, which can enhance their language skills. It stated that.

"We still use it, because we become creative with the monotony and roboticness of ChatGPT, so there are many ways to make this result less robotic. Not just entrusting it to ChatGPT." (Student 3)

By taking advantage of the convenience of AI, students who struggle with thesis writing, particularly in finding references, can gain motivation to explore more sources through various AI tools. It mentioned that.

"If we are stuck looking for references, it means we have to search again to enrich the information needed by using other AI tools." (Student 1)

Most students reported that AI tools made writing activities more efficient, suggesting that AI tools can reduce students' difficulties during the early stages of academic writing. AI tools increase students' confidence in their academic writing by helping them feel that their writing becomes more organized.

The negative results

Despite the positive ones, students also encountered difficulties, which led to negative perceptions. Students identified drawbacks to using AI for thesis writing, including inconsistency, inflexibility, and limited access. They mentioned that

The answer from ChatGPT does not match our request. (Student 1)

"With ChatGPT, if the command is not detailed, the result will be very general, so the idea may not be what we want. " (Student 3)

"The answer is confusing; sometimes it connects to other things. For example, Critical Discourse Analysis (CDA), and then there is Learner Autonomy (LA) too, so the information is mixed between CDA and LA. So, it's incoherent, and I know it's incoherent." (Student 11)

The growing use of AI tools in thesis writing has greatly affected students' research practices, especially their reliance on conventional sources such as the library. This trend has been an issue

since conventional research practices contribute to the acquisition of vital research competencies, such as critical thinking. It stated that

"AI helps me to find examples for academic writing, because when I was an undergraduate, I often went to the library to copy writing and preferred books. Since AI, I rarely go to the library." (Student 14)

Students also feel that relying too heavily on AI may lead to a decline in their critical thinking abilities. They worry that constant dependence on AI-generated content might reduce their ability. It stated that:

"So, the AI is good for making things easier. If we use it too often, it also reduces our creativity in writing, ideas, and our critical thinking also decreases in writing because of the presence of AI, which is all instant." (Student 14)

The negative findings demonstrate that while AI offers many advantages, it also creates risks related to dependency and limited originality. Students who lack critical thinking may accept inaccurate information without questioning its validity, which could impact their academic writing.

The results highlight that AI may motivate students to broaden their writing strategy and manage multiple academic resources. Unfortunately, AI could weaken their creativity and critical thinking skills if they do not manage it properly for academic writing.

How Students with High and Low Critical Thinking Scores Use AI in Thesis Writing

There were differences in the use of AI in thesis writing based on the level of critical thinking. Students with higher critical thinking skills tended to use AI as a tool for thesis writing, such as for outlining. In contrast, students with lower critical thinking skills used AI for the entire thesis-writing process, including completing the paper.

Lower CT Students

Students with lower CT skills primarily use AI at the final stage, primarily for reviewing and verifying their work. They ensure the accuracy and coherence of the entire thesis. It mentioned that

"So, we start with our own ideas, and AI is the final reference. It checks our writing, and once the app gives us a result, we check it again. Since lecturers also check our work using AI, we have to use AI to check our writing too." (Student 14)

Students with lower CT scores use the AI directly, without providing a specific prompt, and rely on it to generate content automatically. They believe that AI could instantly generate the writing. They mentioned that

"There are no instructions at all, just use it as needed, for example, to find the meaning in English, use DeepL." (Student 1)

The findings imply that lower CT students may perceive AI as a shortcut for completing academic tasks. While AI helps them write more efficiently, overreliance may weaken important academic skills, such as originality. Thus, lower CT students appear more vulnerable to passive learning behaviors when using AI tools.

Higher CT Score Students

Meanwhile, students with higher critical thinking skills integrated AI earlier in the writing process, utilizing it for structured tasks such as outlining, brainstorming, and refining arguments. They provided clear and precise instructions to guide AI-generated content. They mentioned that.

"There is instruction, especially usually making an outline, for brainstorming, or finding synonyms, in a limited vocabulary, from there we find more academic words." (Student 11)

Additionally, students with stronger critical thinking skills used AI by providing detailed instructions to guide its output, ensuring that the generated content aligned with their thesis-writing goals. It stated that.

"If the command is not detailed enough, we have to look for other sources. If the answer matches other sources, we can use it. Adjusting ChatGPT answers with other commands and adding new references that we get. The references are already summarized in the article. We summarize them ourselves first, and only then bring them to ChatGPT" (Student 3).

The results showed that students with higher CT skills who used AI tools demonstrated greater strategy in their thesis writing. Students with higher CT also possess analytical skills, as they can strategically guide AI systems to meet their needs.

The findings indicate that higher CT students use AI more critically in academic writing. They maintain control over decision-making. In contrast, lower-CT students tend to rely more on AI tools for output, with less critical evaluation.

Discussion

The findings showed that Artificial Intelligence (AI) and critical thinking (CT) abilities have the potential to support Master's students in thesis writing. Students' perceptions of the use of AI tools in line with their cognitive processes for elaborating ideas in academic writing.

Students concurred that AI tools helped them write better by making the writing process easier. The studies by Lu (2019) and Godwin-Jones (2022) highlighted how AI tools can facilitate surface-level improvements in academic writing. Also, students mentioned that AI tools for academic writing encourage them to think critically because they can elaborate on the writing content. The study by Deep and Chen (2025) highlights that technological advancements in AI facilitate writers in maintaining their critical thinking and expanding the use of AI tools. Thus, students can demonstrate their academic writing skills using various AI tools while developing their critical thinking skills.

However, the research highlights several important problems. According to the data, students were worried about how much AI is used, especially when it makes people less likely to think for themselves and use traditional academic resources. The study by Shen and Teng (2024) cautions against the passive consumption of AI-generated content. Also, the excessive reliance on AI tools hampers critical thinking, fosters academic deception, and poses risks to students' data privacy (Vieriu & Petrea, 2025). Also, the reduction in library use and issues about less originality suggest that AI, when used without critical thinking, could make writers less interested in learning and limit students' chances to build important academic habits.

Furthermore, the study highlights differences in AI use between students with high and low critical thinking when shaping AI tools for academic writing. Students with high CT scores used AI tools strategically, particularly for brainstorming and language refinement. They can elaborate on the writing framework by using suitable prompts in various AI tools for research-based writing (Lin & Chen, 2024). It showed that CT empowers students to maintain their critical thinking despite the use of AI tools in academic writing (Gao et al., 2025). The study by Tahir et al. (2025) showed that students with different English language proficiency will react differently to how AI provides feedback on their academic writing, with their critical thinking predominantly influencing this reaction.

On the contrary, students with lower CT scores frequently relied on AI from the very beginning, without further analysis, for tasks such as content. It showed students' reliance on AI for automated answers rather than using assistance tools when writing academic papers. It aligns with studies by Darwin et al. (2024) and Gerlich (2025), who argue that AI requires robust cognitive skills to ensure ethical and academic integrity and to produce high-quality academic writing.

The study found that critical thinking serves both as a safeguard against the inappropriate use of AI and as a skill that influences students' ability to use AI wisely. The use of AI tools in thesis writing can be beneficial, provided students are prepared to engage with them critically (Badali et al., 2026). It highlights the need for institutions to promote AI literacy training and to integrate critical thinking into AI use, particularly in academic writing courses. It is necessary to remind students that AI tools can assist the writing process, provided they are used strategically and with critical thinking (Akbar, 2025). AI and CT play essential roles in the process of academic writing.

CONCLUSIONS AND SUGGESTIONS

This study suggests that whereas Artificial Intelligence (AI) provides significant assistance in the thesis writing process, particularly in enhancing linguistic precision, vocabulary development, and the generation of preliminary ideas, it cannot supplant the fundamental cognitive function of Critical Thinking (CT). The study revealed that students with elevated CT scores used AI more deliberately and selectively, primarily during the initial drafting phases, including outlining and brainstorming. Conversely, students with lower CT proficiency relied more on AI during the concluding writing stages, frequently using it to finalize or validate their content. This trend indicates that the caliber of AI-assisted writing is significantly correlated with students' capacity to employ critical judgment and reflective methodologies.

This research, notwithstanding its insights, possesses inherent limitations. The participant group was relatively small and confined to a single academic discipline within an Indonesian graduate program, potentially impacting the generalizability of the findings. Moreover, the study depended on self-reported data and observational techniques, which, although detailed, may be prone to bias or restricted generalizability.

Based on these results, universities must integrate critical thinking into writing activities, right alongside teaching students about artificial intelligence. The learning process needs to elaborate on the advancement of AI tools and critical thinking skills, such as through training programs. Thus, students can gain valuable skills and produce better-quality academic writing.

Further research should include a broader range of participants from various academic disciplines and skill sets to examine how CT influences AI engagement. Also, it would be valuable to assess, through a longitudinal study, how critical thinking ability evolves in response to the use of AI tools in academic writing at different levels.

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