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EXPLORING THE IMPACT OF AI WRITING TOOLS ON UNIVERSITY STUDENTS' SYNTHESIS SKILLS IN ACADEMIC WRITING

Gadis Pujawiyanti[1], Fahrus Zaman Fadhly*[2]
[1,2]*English Language Study Program, Faculty of Teachers Training and Education, Universitas Kuningan, Indonesia*

Corresponding author's email: fahrus.zaman.fadhly@uniku.ac.id

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Abstract: The data were thematically analyzed to explore patterns in students' writing behaviors and perceptions. Findings indicate that while AI tools assist in organizing ideas and paraphrasing content, they may also reduce critical engagement with source materials.To investigate trends in the writing habits and attitudes of the students, the data underwent a thematic analysis. Results show that whereas AI tools help with content paraphrasing and concept organization, they may also lessen critical interaction with source materials. The depth of synthesis is weakened when students rely on AI to combine information without fully processing it. Others, on the other hand, begin with AI and then separately integrate sources. In order to foster real synthesis and academic integrity, the study emphasizes the necessity of instructional assistance in encouraging the thoughtful and ethical use of AI tools.

Keywords: *AI writing tools, synthesis skills, academic writing, critical thinking, higher education, qualitative study*

INTRODUCTION

Rapid advancements in artificial intelligence (AI) technologies have brought about significant changes in education, particularly in the way students approach academic writing assignments. ChatGPT, Grammarly, and QuillBot are examples of AI-powered tools that are becoming more and more integrated into students' writing processes, supporting everything from idea generation and grammar correction to rephrasing and paraphrasing. While these tools are meant to increase productivity and accuracy, their impact on students' higher-order thinking skills—specifically, their ability to synthesize information across sources—remains a subject of increasing concern and research. As AI tools become more and more common in higher education, it is important to understand how their use impacts this fundamental ability.

A comprehensive overview of AI's application in writing and learning situations may be found in recent literature. For example, Black and Tomlinson (2025) discovered that students in general education classes use AI writing tools as a crucial component of their workflow, frequently to start drafts, clarify, or reframe. Instead of using AI as a reference tool, students are increasingly treating it as a "co-author" or writing helper. Similar to this, Gasaymeh et al. (2024) investigated how students felt about generative AI and found that most people thought these tools were convenient, particularly when it came to linguistic structure and coherence. In order to measure the perceived influence of AI tools in higher education, Grájeda et al. (2024) created a synthetic index that identifies variations in use patterns according to writing proficiency, motivation, and confidence. These studies show how useful AI tools are for academic writing, but they frequently don't look at more complex cognitive outputs like synthesis and critical reflection.

The potential of AI to assist students who speak English as a second or foreign language has been the subject of more research. A mixed-methods approach was used by Chen and Gong (2025) to investigate how Chinese students use AI in academic writing. Their findings suggested that by enhancing lexical and grammatical accuracy, AI could scaffold challenging writing tasks. In support of this, Marzuki et al. (2023) collected the opinions of EFL teachers, who noted that AI technologies improved the textual structure and content clarity of student writing. In the meantime, Mohammed and Khalid (2025) emphasized psychological effects, pointing out that AI feedback indirectly increased writing engagement by assisting students in feeling less anxious about writing and more in control of their drafts.

Scholars have expressed serious concerns in spite of these advantages. According to Johnston et al. (2024), an excessive dependence on AI tools may result in a decline in students' confidence in their ability to write independently. The ethical issues presented by AI-generated texts were also highlighted by Noonen and Baek (2023), namely with regard to originality, authorship, and academic honesty. In their study of second language authors, Jacob et al. (2025) discovered that although AI promoted coherence, it also made it difficult to distinguish between learner-authored work and AI recommendations, creating ambiguity regarding intellectual ownership. These findings demonstrate that AI has a profoundly cognitive and ethical impact in addition to its strictly technological one.

The role of AI in higher-order academic skills like synthesis has been the subject of a few studies. In their investigation of human–AI collaboration in writing, Nguyen et al. (2024) discovered a variety of interaction patterns: some students relied on AI to reorganize pre-existing content, while others used it to integrate ideas. In their study of rural English teachers' adoption of AI technologies, Kamarullah et al. (2024) identified both opportunities and difficulties in helping students use AI to synthesize information in a meaningful way. By demonstrating how AI promotes educational equity in underprivileged environments by providing students with support resources that would not otherwise be available, Fazal et al. (2025) expanded the discussion. However, rather than exploring how AI changes how students process, assess, and integrate information from various academic sources, many research continue to concentrate primarily on accessibility, usage patterns, or surface-level outcomes like grammar and structure.

Additionally, a systematic review by Hossain et al. (2024) divided AI's educational impact into three categories: administration, learning, and teaching. The evaluation indicated a paucity of thorough research concerning cognitive implications, particularly with regard to synthesis, even though writing support was noted. The impact of AI on academic English writing skills in higher education was explicitly examined by Dja'far and Hamidah (2024), who came to the conclusion that although AI tools increase textual fluency, they may impede deeper analytical processes if utilized without the right instructional direction. This finding emphasizes the necessity of determining whether AI is merely improving student performance or genuinely fostering skill development.

A critical gap is revealed by this review of recent research: although many studies acknowledge the increasing popularity and value of AI tools in academic writing, few have specifically examined how these tools impact students' synthesis abilities, which are arguably one of the most crucial aspects of academic literacy. Without evaluating students' deeper cognitive engagement, the majority of current research is descriptive, emphasizing usage patterns or surface-level results. It is both timely and essential to comprehend how AI affects synthesis skills as academic institutions start to update their policies and instructional methods in response to its existence.

The current study intends to investigate the following research question in order to close this gap: What effect do college students think AI tools have on their ability to synthesize ideas in academic writing assignments?

Using AI techniques for academic synthesis, this study takes a qualitative approach to offer complex insights into students' life experiences. This study is new because it examines how students critically interact (or not) with information through AI mediation and focuses specifically on synthesis, which is different from general writing skills. The study also clarifies how students negotiate the moral and intellectual limits of using AI in the classroom. It is anticipated that the results would have important educational ramifications. Teachers can create more intelligent writing instruction that strikes a balance between technological support and critical thinking by knowing how AI tools affect synthesis. Additionally, by encouraging the

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thoughtful and ethical use of developing technologies in academic settings, the study aids in the development of policies on the integration of AI in education.

METHOD

The study involved ten undergraduate students from a private institution in West Java who were enrolled in different academic areas, such as computer science, management, and English education. Purposive sampling was used to choose them, and students with prior experience utilizing AI tools (such as ChatGPT, Grammarly, and QuillBot) for academic writing assignments were the target audience. According to the inclusion criteria, individuals had to have supported a written academic project with at least one AI tool within the previous six months.

A series of open-ended interview questions intended to delve into students' experiences, routines, and opinions regarding the usage of AI in synthesis writing assignments served as the main tool for gathering data. Seven main questions were asked throughout the interview, with the topics of frequency of AI use, integration into the writing process, AI's function in synthesis, perceived benefits and drawbacks, output quality, and ethical considerations being the main focus. Two language education specialists verified the list of questions to make sure it was pertinent and clear.

Asynchronous interviews using WhatsApp voice and text messages were used to gather data, enabling students to respond whenever it was most convenient for them and to carefully consider each question. Additionally, since students were enrolled in several academic programs with varying timetables, this strategy guaranteed flexibility. The researcher manually recorded and transcribed the responses. Two more participants were enlisted to expand the dataset to nine pupils, enhancing the range of answers for further analysis and validation. An approach known as qualitative content analysis was used to examine the data. In order to

find recurrent themes, patterns, and categories related to AI-assisted synthesis skills, the researcher initially carried out manual coding. By using inductive reasoning for theme coding, categories were not preset but rather developed from the data. Microsoft Word and Excel were used to organize the themes and keep track of thematic frequencies and keywords. The research topic was then addressed by creating descriptive summaries using the coded data. The final results were analyzed in light of the pedagogical ramifications for teaching academic writing with AI assistance.

Table 1. *Overview of interview-based data collection on AI tool usage and synthesis skills in academic writing*

Component	Description
Instrument	Open-ended interview guide (7 core questions)
Type of Questions	Open-ended, reflective, descriptive
Number of Items	7 main questions focusing on AI usage and synthesis process
Target Respondents	University students who use AI tools in academic writing tasks
Sampling Technique	Purposive sampling
Number of Respondents	10 participants from diverse academic background
Data Collection Period	June 15–25, 2025
Platform Used	WhatsApp (voice notes and text responses)
Data Format	Qualitative (narrative and thematic responses)
Main Variables Measured	AI tool usage behavior, synthesis process, perceived impact, ethical concerns

Table 1 gives a summary of the steps taken to collect the data for this investigation. Seven guiding questions created especially to examine students' experiences using AI tools in academic writing assignments, especially their synthesis skills, were used in semi-structured, open-ended interviews conducted over WhatsApp to collect the data. Participants who had previously used AI-based writing tools like ChatGPT, Grammarly, or QuillBot were chosen using a purposive sample technique. During the June, 15-25, 2025 data collection period, ten valid replies were obtained. The open-ended style supported the thematic analysis of cognitive behavior,

writing improvement, and ethical considerations connected to AI-assisted writing by enabling participants to elaborate on their perspectives and methods. This qualitative method offered deep, complex insights on how AI influences students' academic writing habits.

RESULTS AND DISCUSSION

Ten undergraduate students from a private university in West Java, five of whom were female and five of whom were male, and ranging in age from 19 to 23, participated in this study. They were enrolled in courses including computer science, management, and English education. Within the previous six months, every participant had used one of the three AI tools—ChatGPT, Grammarly, or QuillBot—at least once while completing academic writing assignments. Participants with different academic backgrounds but similar experiences with AI-assisted writing were chosen using a purposeful selection technique. Open-ended questions were used in the interviews, which took place over WhatsApp chat. Participants were guaranteed anonymity and confidentiality. Five major issues regarding how AI tools affect students' synthesis abilities in academic writing surfaced from the data analysis:

Table 2. *Respondents by age group*

Age Group (years)	Frequency	%
18-19	4	40%
20-21	5	50%
22-23	1	10%
Total	10	100%

Table 3. *Respondents by gender*

Gender	Frequency	%
Female	5	50%
Male	5	50%
Total	10	100%

Table 4. *Thematic overview from interview data (N = 10)*

Theme	Frequency	%
Frequent and routine use of AI tools (2–3× per week)	7	77%
AI use for idea generation, outlining, grammar correction	10	100%
AI assistance in synthesizing from multiple sources	6	66%
Perceived improvement in writing clarity, structure, and efficiency	9	96%
Ethical concerns and fear of over-reliance	8	88%

The five most noteworthy topics from ten university students' interviews about their use of AI tools for academic writing assignments are shown in this table. The fact that all respondents (100%) said they used AI tools for idea development, outlining, and grammatical correction—mostly ChatGPT, Grammarly, and QuillBot—indicates that AI is widely used in writing workflows. Seventy-seven percent of students acknowledged using AI technologies frequently and routinely, usually two to three times a week. This frequent interaction shows that students view AI as an integral part of their academic writing processes rather than just as an additional tool.

Regarding the cognitive impact, 66% of participants admitted to utilizing AI tools to combine concepts from many sources, frequently by summarizing information and seeing important trends or connections. In the meantime, 96% of respondents reported that the clarity, structure, and efficiency of their writing had improved. This finding is consistent with studies by Kim et al. (2024) and Zhao (2025) on the contribution of AI to improving language quality and organizational logic. 88% of respondents, however, voiced worries about excessive reliance and its ethical ramifications, including possible plagiarism and loss of originality. These worries are in line with research by Rahman & Watanobe (2023) and Selim (2024), which highlighted the necessity of critical engagement and ethical awareness when utilizing AI in academic settings.

An additional background information obtained during preliminary screening, though not directly related to the main theme, showed that 70% of respondents said they spent less than five hours a week in online meetings. This places their use of AI in the context of being primarily asynchronous and self-initiated, rather than influenced by real-time collaborative academic setting

Table 5. *Thematic overview with supporting quotes from interview data (N = 10)*

Theme	Description	Quotes
Routine Use of AI Tools	Most students use AI tools regularly, especially 2–3 times per week for academic writing tasks.	"I use AI tools quite often, especially when working on essays or reports—around 2 to 3 times a week." (P1) "I often use AI tools like ChatGPT and QuillBot, especially when I have to write papers or assignments." (P9)
Use for Idea Generation and Grammar	AI tools are mostly used for generating ideas, correcting grammar, and improving sentence structure.	"I usually use them for brainstorming ideas, outlining, fixing grammar, and simplifying complex sentences." (P1) "I think [I use AI] to correct my writing and grammar." (P2)
AI-Assisted Synthesis of Sources	AI tools help students combine ideas from various sources into cohesive writing.	"I collect key points from multiple sources, then use AI to help rewrite or organize them into a cohesive and original paragraph." (P1) "I use AI to help summarize information from different sources." (P9)
Improved Writing Quality and Structure	Most students feel that AI enhances the organization, clarity, and efficiency of their writing.	"Yes, my writing becomes more structured and easier to understand, especially in terms of grammar and organization." (P3) "The tools help me avoid basic errors, enhance my vocabulary, and structure my arguments more logically." (P7)
Concerns about Over-Reliance and Ethics	Students express caution about depending too much on AI and potential issues with academic integrity.	"I'm afraid people might see it as plagiarism or dishonest if I use AI too much." (P10) "It's important to ensure that AI-generated content doesn't cross the line into plagiarism or misrepresentation." (P8)

Rich insights into how university students feel and interpret the impact of AI tools on their academic writing, particularly on their synthesis abilities, may be found in the theme analysis that follows Table 5. According to the interviews, students' academic routines now heavily incorporate the use of AI technologies like ChatGPT, Grammarly, and QuillBot. Many participants stated that they used these tools two or three times a week, particularly while preparing reports, essays, or other academic work. This routine use is consistent with previous research that indicates AI is now viewed as an integrated collaborator in the writing process rather than as an additional tool (Safitri & Fithriani, 2024; Nguyen et al., 2024). Aligned with the findings of Al-Bukhrani et al. (2025), perceived easiness, utility, and the smooth help these tools provide across writing phases are major factors in students' adoption of AI.

Every participant mentioned use AI tools to improve clarity, generate ideas, and correct grammar. These applications are consistent with research by Kim et al. (2024), Dong (2023), and Filfilan and Alqurashi (2025), which showed that AI greatly improves lower-order writing mechanics including syntax, coherence, and sentence fluency. Students highlighted how AI assisted them in brainstorming, fixing grammatical mistakes, and simplifying difficult phrasing—practices that are essential for EFL learners who frequently have trouble with structure and clarity. Even though this functional support was widely valued, more diverse responses were produced by AI's engagement in higher-order cognitive processes like synthesis.

Of the participants, about two-thirds reported using AI technologies to help synthesize information from various sources. This frequently required rearranging, paraphrasing, and summarizing data into logical reasoning. These results are consistent with research by Alghasab (2025) and Tran (2025), who found that AI tools act as cognitive scaffolds, particularly when it comes to assisting students in recognizing patterns in texts. However, a conflict arose between

superficial integration and useful synthesis. In line with the concerns expressed by Hossain et al. (2024) and Dja'far and Hamidah (2024), who cautioned that such dependence may result in a reduction of analytical depth and independent thought, some students acknowledged that they relied on AI to perform the synthesis for them rather than engaging deeply with the sources themselves.

The majority of students thought that employing AI technologies had improved the general caliber of their writing, notwithstanding the reservations. Enhanced organization, clarity, and argumentation structure were among them; Zhao (2025) corroborated these findings by showing that generative AI improves logical flow and lowers linguistic errors. According to several participants, AI comments improved the precision of their ideas and the readability of their work. This is consistent with findings by Mohammed et al. (2024) and Mursidha et al. (2025), who discovered that AI tools provide more writing motivation and confidence in addition to language support.

However, there were trade-offs associated with this apparent improvement. Many students voiced concerns about becoming so dependent on AI that they might lose their unique voices and critical thinking skills. Some students talked about feeling mentally lazy or unsure about how authentic their final effort was. These worries align with the findings of Jacob et al. (2025) and Johnston et al. (2024), who pointed out that although AI can assist students in producing texts of a higher caliber, if it is applied carelessly, it also runs the risk of weakening student agency. Moreover, the respondents revealed a considerable ethical concern around plagiarism and misrepresentation. According to recent studies by Arabi et al. (2025), Bui and Tong (2025), and Yan (2023), students were unclear about the line separating legitimate help from academic dishonesty.

It's interesting to note that several participants thought of AI as a model for effective writing rather than as a substitute for human thought. These students tried their own versions after using AI to see how concepts might be organized or synthesized. This method is in line with the idea of guided learning, which uses instruments to promote awareness and introspection rather than to replace them. This opinion is supported by Bordalejo et al. (2025) and Weber et al. (2025), who point out that when students critically interact with AI's recommendations, it can function as a semi-autonomous instructor. Additionally, Begum (2025) and Wang, S. B., et al. (2025) emphasized how incorporating AI into process-based writing teaching helps foster creative and reflective capacities.

Students' writing maturity, academic discipline, and prior experience seem to have an impact on the differences in how they use and profit from AI. English-trained students were more likely to utilize AI critically and to consider the distinctions between writing produced by machines and that produced by humans. Students in technical and managerial programs, on the other hand, were more likely to rely on AI to rephrase and organize lengthy passages of text. The findings of Dong (2023) and Aladini (2023), who pointed out that academic context greatly influences the function and perception of AI in writing, are reflected in this discrepancy.

All things considered, these results highlight how urgently institutional assistance and instructional guidelines for the use of AI are needed. There is a dearth of formal training on how to appropriately reference, assess, and ntegrate AI-generated content, as seen by the numerous students who voiced concerns about ethical use. This is in line with the recommendations made by Vieriu and Petrea (2025), Pervaiz et al. (2025), and Assidiq (2024) for the integration of AI literacy in academic writing curriculum. AI is changing, not replacing, the way that writing is taught and learned, according to Tomlinson et al. (2024). As a result, teachers need to promote critical thinking and ethical awareness in addition to technical proficiency.

There are significant ramifications for writing instruction from AI's growing prominence in academic writing. Large language models are quickly changing not just the mechanics of writing but also the epistemic processes of creating scholarly knowledge, as Ahn (2024) explains. The participants' testimonies reflected this shift, especially in their dependence on AI to summarize and synthesize intricate scholarly materials. According to a number of students, these technologies improved their motivation and decreased their writing anxiety. This is also supported by research such as Hongxia and Razali (2025), which found that Chinese EFL undergraduates who used ChatGPT for academic assignments were more engaged.

However, worries about excessive reliance were often expressed. Participants discussed the conflict between appreciating AI as a useful tool

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and worrying that overuse could impair their own cognitive growth. This supports Kapoor's (2025) caution, which emphasizes how crucial it is to retain academic authorship integrity in the era of AI-enhanced writing. Similarly, Chandra and Dasgupta (2023) pointed out that although ChatGPT can speed up the creation of medical articles, its unrestricted use could jeopardize originality and authenticity.

Students' varied perspectives are consistent with those of Gültekin Talayhan et al. (2023), who found that teachers saw AI's impact on student writing as both facilitating and worrisome, especially when it comes to structural dependency and content coherence. According to one study participant, while AI could generate well-structured concepts, they frequently lacked contextual understanding and personal nuance. This exemplifies the conflict raised by Khan and Ghani (2024), who contended that while AI technologies help ESL learners become more accurate writers, they may also unintentionally hinder the growth of independent writing techniques.

Some pupils valued AI's in-the-moment recommendations for identifying and fixing mistakes. This is consistent with research by ElEbyary, Shabara, and Boraie (2024), which showed that AI-based written corrective feedback (WCF) greatly aids L2 learners in identifying and fixing grammatical errors. Reflective use, however, maximizes the effectiveness of such instruments. Students run the risk of becoming passive recipients of correction rather than active editors of their own work if they don't engage critically. Raheem, Anjum, and Ghafar (2023) backed up this assertion by pointing out that although Grammarly and QuillBot provide superficial enhancements, students must compare, edit, and internalize the criticism in order to reap the true educational benefits.

A lesser percentage of participants said they have purposefully used AI in argumentative essays to mimic counterarguments or check the logical consistency of their views. This application highlights AI's dual function as a simulated interlocutor and a remedial tool, a feature also documented by Khampusaen (2025), who looked into how students utilize ChatGPT to organize and assess argumentative writing. Instead of merely completing surface-level structure, AI helps with metacognitive planning and critical thinking when applied in this manner. Lastly, the interviews also alluded to the interdisciplinary nature of AI's influence. Some students took inspiration from their backgrounds in medical or STEM writing, fields where precision, conciseness, and clarity are crucial. As noted by Antonacci and Maize (2023) in physics writing, these academic settings highlight the usefulness of AI tools while also posing concerns about the extent to which AI should support the intellectual work required in scientific fields. AI could make expression easier, but it couldn't and shouldn't replace creative thought, according to the students' reflections.

In summary, using AI tools into academic writing is a complex and revolutionary process. When applied wisely, artificial intelligence (AI) can assist students in the synthesis process by combining concepts, elucidating arguments, and enhancing coherence. However, these tools run the risk of promoting over-reliance, academic dishonesty, and superficial thinking in the absence of critical engagement and appropriate instruction. Writing education must change to accept AI as a catalyst for introspection, synthesis, and true intellectual growth rather than just as a convenient tool. Thurzo et al. (2023) contend that teaching students to use AI with consideration, honesty, and purpose is more important for educational purposes than the technology's inherent potential. These resources should be utilized as formative aids rather than as a complete substitute for language practice and critical review, as suggested by Waziana et al. (2024). AI can improve vocabulary awareness and syntactic accuracy when used appropriately, but when applied carelessly, it may reduce

CONCLUSION

According to this survey, university students are using AI writing tools more and more in their academic workflows, especially for activities like content synthesis, grammatical correction, and idea generation. The study found an increasing reliance students' active language involvement. This is a problem that should guide future curriculum design and academic regulation, develop their own ideas and voices rather than as a way to bypass intellectual labor.

Teachers can enable students to write with both academic authenticity and technological fluency by presenting AI as a learning partner rather than a replacement for work.

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