



Artificial Intelligence and the Decline of Students' Authentic Academic Writing Skills: Evidence from a Mixed-Methods Study

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Article Info

Article history:

Received: May, 11, 2026

Revised: June, 19, 2026

Accepted: July, 23, 2026

Keywords:

Academic Integrity;
Artificial Intelligence;
Authentic Academic Writing;
Higher Education;
Writing Autonomy.

Abstract

The growing presence of artificial intelligence (AI) in higher education has changed the way students approach academic writing. While AI-powered tools offer practical support in generating ideas, organizing texts, and refining language, their increasing use has also raised concerns about the originality and authenticity of students' written work. This study aims to examine how AI influences students' authentic academic writing skills and to identify the patterns of dependence that emerge during the writing process. A convergent mixed-methods design was employed by integrating quantitative data from questionnaires completed by 71 third-semester English education students in Makassar, Indonesia, with qualitative evidence drawn from fifteen empirical and conceptual studies published between 2024 and 2025. Descriptive statistics were used to analyze the survey data, whereas thematic synthesis was applied to the literature findings. The results indicate that students rely on AI to varying degrees across different stages of academic writing. Five interrelated forms of dependence were identified, namely dependence on idea generation, language and text organization, revision and editing, cognitive and metacognitive processes, and writing autonomy. However, the findings suggest that AI is not inherently responsible for weakening students' writing abilities. Instead, the erosion of authentic writing tends to occur when technological assistance replaces the reflective, critical, and self-regulatory processes that are central to academic writing. These findings underscore the importance of developing educational practices that encourage students to use AI responsibly while maintaining intellectual ownership and academic integrity.

To cite this article: Yahrif, M., Sirajuddin, S., Khaedar, M. (2026). Artificial Intelligence and the Decline of Students' Authentic Academic Writing Skills: Evidence from a Mixed-Methods Study. *Al Qodiri: Jurnal Pendidikan, Sosial dan Keagamaan*, 24(2), 939-954.

INTRODUCTION

The rapid advancement of artificial intelligence (AI) has transformed the educational landscape, particularly in higher education, where digital technologies increasingly mediate teaching, learning, and assessment practices. Over the past few years, generative AI platforms such as ChatGPT, Gemini, Grammarly, and other automated writing assistants have become common tools among university students. These applications offer immediate support for brainstorming, organizing ideas, refining language, and revising academic texts, thereby reshaping how students approach writing tasks (Abdullah, 2022; Khalifa & Albadawy, 2024; Tseng & Lin, 2024). Recent evidence suggests that AI adoption among students has reached an unprecedented level, with a large majority reporting regular use of AI technologies in their academic activities (Grassini, 2023; Kamalov et al., 2023; Marengo et al., 2024). While these developments promise greater efficiency and accessibility, they also provoke fundamental questions about the nature of learning and authorship in higher education. Academic writing has long been understood not merely as a means of communication but as an intellectual process through which students construct knowledge, develop arguments, and cultivate critical thinking skills (Ou et al., 2024). Consequently, the growing integration of AI into writing practices has generated widespread debate regarding the authenticity of students' academic work.

The debate surrounding AI-assisted writing reflects broader tensions between technological innovation and educational values. Supporters of AI argue that intelligent writing systems can

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democratize learning by helping students overcome linguistic barriers, improve productivity, and access knowledge more efficiently (Bulathwela et al., 2024; Davoodi, 2024). From this perspective, AI serves as an instructional aid that enhances students' performance without necessarily diminishing their cognitive engagement (Gkintoni et al., 2025; Meng et al., 2025; Yaseen et al., 2025). Nevertheless, critics contend that the extensive use of generative AI risks reducing students' independence by encouraging them to delegate core intellectual tasks to machines (Chugh et al., 2025; García-López & Trujillo-Liñán, 2025). The ability of AI applications to generate coherent paragraphs, formulate arguments, and revise texts within seconds has blurred the boundaries between human authorship and algorithmic assistance. As a result, educators increasingly question whether students' written assignments genuinely reflect their own understanding and analytical abilities. This controversy demonstrates that the impact of AI extends beyond technological efficiency and reaches the foundations of academic integrity and scholarly culture.

Concerns about the authenticity of students' writing are particularly significant because academic writing represents a complex cognitive activity rather than a purely technical skill (Crawford et al., 2023; Lin et al., 2022; Werdiningsih et al., 2024). Writing requires learners to formulate ideas, evaluate evidence, organize arguments, and continuously reflect on the quality of their work. According to Cognitive Process Theory, these activities involve iterative processes of planning, translating, and reviewing that are essential for intellectual development. However, the emergence of AI-generated content has altered this traditional process by enabling students to outsource substantial portions of their cognitive work (Hooper, 2025; Jose et al., 2025). Studies have shown that students increasingly rely on AI not only for grammar correction but also for generating ideas, constructing paragraphs, and making decisions about content organization (Marzuki et al., 2023; Widiati et al., 2023; Zhao, 2025). Although such assistance may reduce the time and effort required to complete assignments, it also raises concerns regarding the gradual erosion of critical thinking and independent learning. Consequently, understanding the educational implications of AI-mediated writing has become an urgent scholarly concern.

The urgency of this issue is further amplified by the rapid expansion of AI technologies across universities worldwide. Institutions are currently revising assessment systems, academic policies, and teaching practices in response to the widespread adoption of generative AI tools (An et al., 2025; Dabis & Csáki, 2024; Moorhouse et al., 2023). At the same time, faculty members face increasing difficulties in distinguishing original student work from AI-generated texts, particularly as language models become more sophisticated and accessible. Beyond questions of plagiarism and academic misconduct, there is growing apprehension that excessive dependence on AI may weaken students' long-term competencies in reasoning, communication, and problem solving (Adamakis & Rachiotis, 2025; Zhai et al., 2024). Such concerns are especially relevant in developing contexts, where variations in digital literacy and technological access may shape students' patterns of AI use in different ways. If higher education institutions fail to understand how AI influences students' writing behavior, they risk producing graduates who are technically proficient but insufficiently prepared for independent intellectual work (Deep & Chen, 2025). Therefore, empirical investigations into the relationship between AI and academic writing authenticity are increasingly necessary.

Existing studies have offered important insights into the opportunities and challenges associated with AI in education. A growing body of literature indicates that AI tools can improve students' productivity, enhance grammatical accuracy, and support the completion of academic tasks (Song & Song, 2023). Other scholars have emphasized the potential of AI to foster self-directed learning and strengthen students' confidence in writing activities (Mohebbi, 2024; C. Wang et al., 2024). Systematic reviews also suggest that AI can function as a complementary resource when integrated into pedagogically meaningful learning environments (Alemany-Arrebola et al., 2025; Hariyanto et al., 2025; D. Wang & Huang, 2025). At the same time, empirical evidence reveals that uncontrolled AI use may encourage plagiarism, standardize writing styles, and diminish students' ownership of ideas (Chick, 2025). Experimental findings further indicate that excessive reliance on generative AI is associated with lower levels of creativity and critical engagement among university students (Habib et al., 2024). Collectively, these studies demonstrate that AI exerts both constructive and disruptive influences on academic writing.

Despite these contributions, previous research remains fragmented in several important respects. Much of the existing literature focuses primarily on ethical considerations, students'

perceptions, and technological acceptance, while relatively few studies investigate how AI reshapes the cognitive dimensions of academic writing (Baldrich et al., 2025; Naznin et al., 2025; Papakonstantinidis et al., 2024). Furthermore, many scholars treat AI-assisted writing as a single phenomenon without distinguishing between forms of use that support learning and those that replace essential intellectual processes (BaHammam, 2025; C. Wang et al., 2025). Most empirical investigations concentrate on final writing products rather than examining how dependence on AI develops across different stages of writing, from idea generation to revision and evaluation. Evidence from developing countries is also comparatively limited, despite substantial differences in educational infrastructure and digital literacy (Akpan et al., 2024; Costan et al., 2021; Han & Kumwenda, 2025). As a consequence, current scholarship offers only a partial understanding of the mechanisms through which AI may influence students' writing authenticity. Addressing these shortcomings is crucial for developing a more nuanced and evidence-based perspective on AI-mediated learning.

Another limitation of earlier studies concerns their theoretical orientation. Academic writing has traditionally been explained through Cognitive Process Theory, which conceptualizes writing as a recursive activity involving planning, drafting, and revising (Kormos, 2023; Scharlau et al., 2021). More recent perspectives, however, suggest that the emergence of AI requires researchers to reconsider the relationship between technology and human cognition (Grinschgl & Neubauer, 2022; Neubauer, 2021; Raikov & Pirani, 2022). The concept of cognitive offloading explains how individuals transfer mental tasks to external tools in order to reduce cognitive effort, a process that may influence learning and decision-making (Gerlich, 2023; Gilbert, 2024). In parallel, the growing literature on human-AI collaboration highlights that intelligent systems increasingly shape students' agency, self-regulation, and authorship (Anderson et al., 2021; Chang & Sun, 2024). Although these theoretical perspectives offer valuable insights, they have rarely been integrated to explain how patterns of dependence emerge in academic writing practices. Consequently, there remains a significant gap in understanding the progressive ways through which AI transforms students' relationships with writing.

Building upon these gaps, the present study seeks to examine students' current conditions regarding the disruption of academic writing authenticity in the age of artificial intelligence and to explain how AI contributes to the decline of authentic academic writing skills among university students. Employing a convergent mixed-methods design, this study combines quantitative evidence derived from English education students with a qualitative synthesis of recent empirical and conceptual studies. Unlike previous research that primarily emphasizes ethical debates or technological acceptance, this study proposes a multidimensional explanation of AI dependence encompassing ideation dependence, language and structure dependence, revision and editing dependence, cognitive and metacognitive dependence, and the gradual loss of writing autonomy. The study also contributes theoretically by integrating Cognitive Process Theory, cognitive offloading perspectives, and human-AI co-writing frameworks into a single analytical lens. From a practical standpoint, the findings are expected to assist educators, curriculum developers, and higher education institutions in designing pedagogical strategies that encourage responsible and reflective AI use. Ultimately, this research argues that the future of academic writing depends not on rejecting technological innovation but on ensuring that AI strengthens rather than replaces students' intellectual engagement, critical thinking, and academic integrity.

METHOD

Research Design

This study employed a convergent mixed-methods design to investigate the influence of artificial intelligence on the authenticity of students' academic writing. This design was selected because the research addresses two complementary objectives: describing students' current patterns of AI use in academic writing and explaining the mechanisms through which AI may contribute to the decline of authentic writing practices. In accordance with the convergent model proposed by Creswell and Plano Clark (2018), quantitative and qualitative data were collected during the same period, analyzed separately, and integrated during the interpretation stage. The

quantitative strand focused on students' perceptions and writing behaviors, whereas the qualitative strand synthesized empirical and conceptual evidence from previous studies related to AI-assisted writing. Combining these two approaches enabled the researchers to obtain a broader and more nuanced understanding of the phenomenon than could be achieved through a single-method design. Rather than seeking to establish causal relationships, the study adopted a descriptive orientation intended to capture contemporary trends and emerging patterns associated with AI-mediated academic writing.

Research Setting and Period

The study was conducted in two universities located in Makassar, Indonesia, involving undergraduate students enrolled in English Education programs. The research setting was chosen because students in these programs routinely engage in academic writing activities and have increasing access to generative artificial intelligence technologies, including ChatGPT and similar writing applications. Data collection was carried out during the 2025–2026 academic year, after participants had completed academic and professional writing courses. At this stage, students had acquired sufficient experience in composing essays, reports, and other forms of scholarly writing, making them suitable participants for the study. Simultaneously, the qualitative component of the research was undertaken through a systematic search of scholarly databases and scientific journals published within the last several years. The selected context allowed the researchers to examine how AI technologies interact with students' writing practices in contemporary higher education.

Participants and Sampling Technique

The target population comprised undergraduate students in English Education programs who had previous experience using artificial intelligence to support academic activities. Participants were selected using purposive sampling because the study required individuals with specific characteristics relevant to the research objectives. The final sample consisted of seventy-one third-semester students drawn from two universities in Makassar. To ensure the appropriateness of the sample, several inclusion criteria were established. Participants were required to have completed academic writing courses, to be familiar with AI-based writing tools, and to be willing to participate voluntarily in the research. Students who had not yet taken writing-related courses or who had no experience using AI applications were excluded from the study. Prior to data collection, all participants were informed about the objectives and procedures of the research and provided their consent. Ethical considerations, including anonymity, confidentiality, and voluntary participation, were maintained throughout the study.

Research Instruments

Two instruments were employed to collect quantitative and qualitative data. The quantitative instrument consisted of a structured questionnaire containing twenty-five items measured using a five-point Likert scale ranging from strongly disagree (1) to strongly agree (5). The questionnaire was developed to examine students' perceptions and behaviors concerning the role of AI in academic writing. Drawing upon Cognitive Process Theory, Self-Regulated Learning Theory, and recent discussions on human–AI collaboration, the instrument measured five dimensions: ideation dependence, language and structure dependence, revision and editing dependence, cognitive and metacognitive dependence, and loss of writing autonomy. Each dimension represented a particular stage in students' interaction with AI during the writing process. The qualitative instrument took the form of a structured literature review protocol adapted from Fink (2019). This protocol guided the identification, selection, and analysis of previous studies discussing artificial intelligence, academic writing authenticity, cognitive offloading, and AI-assisted learning in higher education. A set of predefined keywords—including artificial intelligence, ChatGPT, academic writing, authorship, and student dependence—was employed to locate relevant publications. Only empirical and conceptual studies published in peer-reviewed journals and directly related to higher education contexts were included in the review.

Instrument Validity and Reliability

To establish content validity, the questionnaire underwent expert review by academics specializing in English education, academic writing, and educational technology. The reviewers evaluated the relevance, clarity, and representativeness of each item in relation to the constructs

being measured. Suggestions provided during the review process were incorporated into the final version of the instrument. Construct validity was subsequently examined using Pearson's product-moment correlation analysis in IBM SPSS Statistics. Based on responses from seventy-one participants, all twenty-five items demonstrated positive and statistically significant correlations with the total score at the .05 significance level, indicating that the instrument adequately captured the intended constructs. To assess internal consistency, Cronbach's alpha was calculated for the entire questionnaire. The analysis yielded an alpha coefficient of .895, indicating a high level of reliability and confirming that the instrument was suitable for further analysis.

Data Collection Procedure

Data collection was conducted through several interrelated stages designed to ensure methodological rigor and consistency. The process began with the identification of the research problem and a comprehensive review of literature on artificial intelligence, academic writing authenticity, cognitive offloading, and human-AI collaboration. Building on these theoretical foundations, the researchers formulated the research objectives and selected an appropriate mixed-methods design. Subsequently, eligible participants were recruited through purposive sampling, and the research instruments were developed and refined. After the questionnaire and literature review protocol had been validated, quantitative and qualitative data were collected concurrently. Quantitative data were gathered through an online survey platform, allowing participants to complete the questionnaire independently and anonymously. At the same time, qualitative data were obtained through a systematic search of scholarly databases and journal repositories. Relevant studies were selected based on publication recency, contextual relevance, and conceptual contribution to the topic under investigation. The overall research procedure is summarized in Figure 1.



Figure 1. Research Procedure of the Convergent Mixed-Methods Study

The research procedure began with the identification of the problem and the development of the theoretical framework. The study then proceeded to participant selection, instrument development, and instrument validation. Following the collection of quantitative and qualitative evidence, each dataset was analyzed independently using methods appropriate to its nature. Finally, the findings from both strands were integrated to generate a comprehensive explanation of the ways in which artificial intelligence influences students' authentic academic writing practices and to formulate pedagogical implications for higher education.

Data Analysis

The quantitative and qualitative datasets were analyzed separately before being integrated during the interpretation phase. Quantitative data obtained from the questionnaire were processed using IBM SPSS Statistics. Descriptive statistical techniques, including frequencies, percentages,

means, and standard deviations, were employed to describe students' responses across all questionnaire items and dimensions. Because the purpose of the study was exploratory and descriptive, the analysis focused on identifying patterns and tendencies rather than making broad inferential claims. The criteria for statistical interpretation followed conventional standards, with significance levels set at $p < .05$ for validity testing. The qualitative data derived from the literature review were analyzed through thematic synthesis. The procedure involved repeated reading of selected studies, open coding of key findings, grouping similar concepts into categories, and developing broader themes that explained the relationship between AI use and academic writing authenticity. Through this process, five overarching themes emerged: ideation dependence, language and structure dependence, revision and editing dependence, cognitive and metacognitive dependence, and loss of writing autonomy. After the completion of both analyses, the findings were integrated following the principles of convergent mixed-methods research. Quantitative results describing students' current conditions were interpreted alongside qualitative themes derived from previous studies. This integration enabled the researchers to explain not only the extent to which AI has become embedded in students' writing practices but also the mechanisms through which dependence on AI may gradually weaken authentic academic writing skills. The combined analysis ultimately provided a more comprehensive understanding of the opportunities and risks associated with artificial intelligence in higher education.

RESULTS AND DISCUSSION

Results

Students' recent condition in terms of the AI's disruption towards their academic writing authenticity.

To address the first research objective, a descriptive statistical analysis was conducted to examine students' recent conditions regarding the disruption of academic writing authenticity caused by AI. The analysis focused on students' self-reported perceptions and behaviours as reflected in their responses to the questionnaire. This study revealed students' actual writing behaviours, perceptions, and concerns related to the use of ChatGPT. The analysis explains a clear pattern indicating that AI has become deeply embedded in students' academic writing practices, particularly at the early and core stages of the writing process. The analysis is completely based on the following questionnaire items

1. I use ChatGPT to find the main ideas before I start writing.
2. I find it difficult to begin academic writing without the help of ChatGPT.
3. Ideas generated by ChatGPT often become the main basis of my writing.
4. I trust ideas from ChatGPT more than my own ideas.
5. Without ChatGPT, I need more time to determine a writing topic.
6. I use ChatGPT to construct academic sentences.
7. The paragraph structure of my writing is largely influenced by ChatGPT.
8. I copy or modify sentences from ChatGPT for academic assignments.
9. I feel that my writing sounds more "academic" after using ChatGPT.
10. I rarely write academic sentences independently without ChatGPT.
11. I rely on ChatGPT to correct the grammar of my writing.
12. I ask ChatGPT to revise my writing before submission.
13. I rarely conduct self-editing without ChatGPT's assistance.
14. I believe ChatGPT's revisions are better than my own revisions.
15. I feel unsure about my writing before it is checked by ChatGPT.
16. I tend to follow ChatGPT's suggestions without questioning them.
17. I rarely re-evaluate the ideas provided by ChatGPT.
18. I feel that my critical thinking ability decreases when I use ChatGPT.
19. I use ChatGPT as the "final decision-maker" for my writing content.
20. I focus more on the final product than on the thinking process when using ChatGPT.
21. I find it difficult to write academic texts without ChatGPT.

22. My confidence in writing independently has decreased because of ChatGPT.
23. I tend to postpone writing tasks until I use ChatGPT.
24. I feel that my dependence on ChatGPT affects the authenticity of my writing.
25. I am concerned that my academic writing ability will decline without ChatGPT.

The descriptive statistical analysis of the 25 questionnaire items was preceded by using SPSS, which provided an overview of students' recent conditions regarding the influence of artificial intelligence on their academic writing authenticity. All items were rated on a five-point Likert scale by 71 respondents, with mean scores ranging from 2.03 to 3.83. The analysis detail is explained in the following table.

Table 1. Descriptive Statistics of Students' Recent Condition in terms of AI's disruption

	N	Minimum	Maximum	Mean	Std. Deviation
Q1	71	1	5	3.31	.994
Q2	71	1	5	2.80	1.037
Q3	71	1	5	2.93	1.073
Q4	71	1	5	2.03	.941
Q5	71	1	5	3.11	1.090
Q6	71	1	5	3.30	1.006
Q7	71	1	5	3.10	.943
Q8	71	1	5	3.31	1.077
Q9	71	1	5	3.24	1.075
Q10	71	1	5	2.83	1.095
Q11	71	1	5	3.83	1.095
Q12	71	1	5	3.46	1.274
Q13	71	1	5	2.85	1.037
Q14	71	1	5	2.76	1.224
Q15	71	1	5	3.03	1.171
Q16	71	1	5	2.08	1.025
Q17	71	1	5	2.06	.998
Q18	71	1	5	3.79	1.158
Q19	71	1	5	2.82	1.073
Q20	71	1	5	2.76	1.088
Q21	71	1	5	2.85	1.037
Q22	71	1	5	3.30	1.061
Q23	71	1	5	2.93	1.163
Q24	71	1	5	3.25	1.065
Q25	71	1	5	2.79	1.081
Valid N	71				

Overall, the results indicate a moderate level of AI-related disruption, suggesting that AI has become a regular component of students' writing practices, although the degree of dependence and perceived impact varies across different aspects of the writing process. In the pre-writing stage, the findings show that students tend to rely on AI to support idea generation and topic development. Several items measuring this dimension recorded mean scores slightly above the midpoint of the scale, indicating that students often use AI tools to help them initiate writing tasks and organize their ideas. However, the moderate mean values also suggest that students do not completely abandon their own thinking, but rather combine personal input with AI-generated suggestions. This pattern reflects an emerging dependence on AI at the early stages of writing, where cognitive effort is increasingly shared with technological tools.

In the sentence and paragraph construction stage, the results reveal a comparable pattern of moderate reliance on AI. Items related to using AI for constructing academic sentences and shaping paragraph structure yielded mean scores around the mid-to-upper range of the scale. These findings suggest that students perceive AI as helpful in producing academically appropriate in producing academically appropriate language and organization. At the same time, the variability indicated by the standard deviations implies that not all students depend on AI to the same extent, with some maintaining greater control over their sentence-level writing than others.

Building students' reliance on AI during the pre-writing and drafting stages, the findings further indicate a strong dependence on AI at the revision and editing stage. Items related to grammar correction and text revision recorded relatively higher mean scores, suggesting that students commonly position AI as a final checkpoint before submitting their academic work. This pattern reinforces the earlier observation that AI is integrated across the entire writing process, from idea generation to final polishing, rather than being used as a supplementary tool. While such reliance may enhance linguistic accuracy, it simultaneously limits students' engagement in self-editing and reflective revision, which are essential to the development of authentic academic writing skills.

Consistent with this pattern of end-to-end AI involvement, the results also reveal changes in students' critical engagement and writing confidence. Moderate to low mean scores on items measuring the questioning of AI-generated suggestions suggest that students tend to accept AI outputs with minimal evaluation, extending the dependence observed at earlier writing stages into decision-making processes. At the same time, responses related to confidence indicate growing uncertainty about writing independently without AI support. Collectively, these findings portray a condition in which academic writing authenticity is increasingly mediated by AI across multiple stages of the writing process. Although students continue to contribute personal input, their authorship is progressively weakened as independent cognitive engagement is partially replaced by technological assistance.

How AI Declines Students' Authentic Academic Writing Skills.

In answering the second objective, the findings in this research have synthesized 15 studies that have been listed below;

Table 2. Summary of Previous Studies on the Impact of Artificial Intelligence on Students' Authentic Academic Writing Skills

No	Author	Year	Research Method	Key-points
1	Naima et al	2024	Systematic Literature Review	AI may enhance writing skills, but it also poses risks of passive learning and loss of an authentic writing style.
2	Takuna et al	2025	Students' Writing Task Assessment (Qualitative)	Students who frequently use artificial intelligence in writing assignments have fair to poor writing skills, particularly struggling with language use, as found in a qualitative study of 10 students using a writing test and Jacob's writing rubric
3	Ziar	2025	Quantitative Descriptive	AI tools improve grammar and productivity but may lead to over-reliance and reduced critical thinking, potentially declining authentic writing skills, based on a study of 100 students using structured questionnaires.
4	Deep et. al	2025	The Assessment of Narrative Review Articles (SANRA)	AI tools can be detrimental to writing skills, but may also foster self-directed learning when integrated into coursework
5	Zahra et. al	2025	A qualitative case study	AI tools decline students' authentic writing skills by increasing dependency, standardizing writing styles, and diminishing critical thinking and problem-solving abilities, as found in a qualitative case study involving 10 students and 2 teachers.

6	Aritonang er. al	2025	Qualitative Study	Case	Unethical AI tool usage significantly declines academic writing ability in coherence, depth, and complexity among 20 English students
7	Mengjun Xi	2024	Descriptive study		AI integration in English writing learning declines creative learning, weakening authentic writing skills.
8	Niloy et al	2023	Quantitative		The use of ChatGPT is associated with a decline in university students' creative writing abilities, as evidenced by an experimental study involving 600 students from 10 universities, using the Wilcoxon Signed-Rank test for analysis
9	Rosdiana et.al	2024	A descriptive qualitative method		The study suggests that AI improves students' writing abilities by providing convenience in tasks such as referencing and sentence structure checking.
10	Losi et al	2024	Library research		AI tools enhance EFL students' writing skills, improving speed, accuracy, and self-confidence. It is contrary to this research topic.
11	Reis et al	2023	Systematic literature review		AI complements students' writing skills, enhancing the process without replacing them.
12	Rahman et al	2022	Mixed method		There are positive perceptions of AI software in improving writing skills, with no mention of declining authentic writing styles.
13	Rahman & Yaumi	2024	Descriptive Quantitative		Rather than focus on AI technology, human capital should be prioritized first to become competent in pedagogic, social, and professional skills by using AI as an aid to be used wisely.
14	Rahman et al	2024	Literature study		The use of AI is highly potential to commit plagiarism and academic cheating.
15	Ningsih et al	2023	Library research		ChatGPT challenges teachers and students to deal with the implications of the disruption of ChatGPT, such as a lack of human expertise, inability, hoax spread, and limited interpersonal skills.

Discussion

The findings indicate that artificial intelligence has become an integral component of students' academic writing practices, particularly during the initial stages of idea generation and topic development. The moderate scores recorded for these dimensions suggest that students increasingly employ AI systems to reduce the cognitive demands associated with planning and organizing academic texts. From the perspective of Cognitive Process Theory, writing is fundamentally a recursive activity that involves generating ideas, evaluating alternatives, and transforming knowledge into coherent arguments (Kormos, 2023). The growing tendency to rely on AI during these early stages implies that part of this intellectual effort is gradually being transferred to technological systems. This pattern supports the concept of cognitive offloading, which explains how individuals strategically delegate mental tasks to external tools to minimize cognitive burden (Gilbert, 2024; Hooper, 2025). Similar findings have been reported by Marzuki et al. (2023), Widiati

et al. (2023), and Zhao (2025), who observed that university students increasingly use generative AI not merely as a source of information but also as a mechanism for initiating and directing academic work. Nevertheless, the present findings suggest that the problem lies not in the existence of AI itself, but in the extent to which students substitute reflective thinking with algorithmic assistance.

A comparable pattern emerges in students' dependence on AI for sentence construction and textual organization. The results demonstrate that many participants perceive AI-generated suggestions as useful in producing linguistically accurate and academically acceptable writing. Previous studies have similarly emphasized that AI-powered applications can improve grammatical precision, writing fluency, and productivity (Khalifa & Albadawy, 2024; Tseng & Lin, 2024; Song & Song, 2023). However, the present study extends these arguments by showing that the increasing reliance on AI for language production may alter students' relationship with authorship itself. Human-AI collaboration theories propose that intelligent systems no longer function merely as passive instruments but increasingly participate in shaping human decision-making and creative processes (Chang & Sun, 2024; Ou et al., 2024). Consequently, students may gradually perceive academic writing as a collaborative activity between human cognition and machine-generated content. While this transformation can facilitate learning, it simultaneously raises concerns regarding intellectual ownership and the extent to which written products genuinely represent students' analytical abilities. In this regard, the findings reinforce concerns expressed by Chick (2025) and García-López and Trujillo-Liñán (2025) regarding the increasingly blurred boundaries between authentic authorship and technological intervention.

The strongest indication of AI dependence appears in the revision and editing phase, where students reported extensive use of AI to correct grammar, refine language, and evaluate the quality of their texts. This finding demonstrates that AI is not confined to peripheral aspects of writing but has become embedded throughout the entire composition process. Although such practices may improve the linguistic quality of students' work, they also reshape the educational value of revision itself. According to Cognitive Process Theory, revision represents a critical stage in which writers reconsider arguments, identify weaknesses, and reconstruct meaning through self-reflection (Scharlau et al., 2021; Kormos, 2023). When revision is delegated primarily to AI systems, students may lose opportunities to develop metacognitive skills that are essential for academic growth. This interpretation aligns with the arguments of Deep and Chen (2025) and Jose et al. (2025), who contend that excessive technological convenience may reduce learners' willingness to engage in cognitively demanding tasks. Therefore, AI-assisted revision should not be interpreted solely as an indicator of technological advancement, but also as a pedagogical challenge that requires careful educational mediation.

Beyond technical support, the findings reveal a more subtle transformation in students' cognitive engagement with academic writing. Responses related to questioning AI-generated outputs suggest that many students accept algorithmic recommendations with limited critical evaluation. This tendency reflects one of the central assumptions of cognitive offloading theory, namely that individuals often prioritize efficiency over cognitive effort when external support systems are available (Gerlich, 2023; Gilbert, 2024). Although outsourcing certain tasks may increase productivity, it can also weaken opportunities for critical reflection and independent reasoning. Similar concerns have been raised by Habib et al. (2024), Zhai et al. (2024), and Chugh et al. (2025), who found that excessive reliance on generative AI may negatively affect creativity, analytical thinking, and problem-solving abilities. However, the present study contributes a more nuanced perspective by demonstrating that the decline in critical engagement occurs progressively across multiple stages of writing rather than as an immediate consequence of AI use. In other words, the erosion of authentic academic writing appears to emerge gradually as students become accustomed to delegating increasingly complex cognitive activities to intelligent systems.

The findings also point to a decline in students' confidence in their ability to write independently. Many participants expressed uncertainty about completing academic assignments without AI assistance, suggesting that technological dependence may influence not only writing practices but also learners' perceptions of their own competence. From the perspective of self-regulated learning, academic writing requires individuals to monitor their progress, evaluate their performance, and maintain confidence in their intellectual capabilities (Mohebbi, 2024; Wang et al., 2024). The present results indicate that, instead of strengthening autonomy, unrestricted AI use may

create a form of psychological dependence in which students increasingly rely on external validation. Similar tendencies have been identified by Baldrich et al. (2025) and Papakonstantinidis et al. (2024), who reported that AI adoption influences students' sense of agency and responsibility in learning. Nevertheless, this study advances existing scholarship by demonstrating that declining confidence is closely associated with students' perceptions that AI provides more reliable judgments than their own reasoning. Such a shift has profound implications because authentic academic writing depends not only on technical competence but also on writers' confidence in their capacity to formulate and defend original ideas.

An important contribution of this study lies in its identification of five interrelated dimensions of AI dependence: ideation dependence, language and structure dependence, revision and editing dependence, cognitive and metacognitive dependence, and the gradual loss of writing autonomy. Unlike previous studies that have predominantly examined AI from ethical, technological, or attitudinal perspectives (Naznin et al., 2025; BaHammam, 2025; Baldrich et al., 2025), the present research conceptualizes AI dependence as a progressive cognitive process that unfolds across different stages of academic writing. By integrating Cognitive Process Theory, cognitive offloading perspectives, and human-AI co-writing frameworks, this study offers a more comprehensive explanation of how intelligent technologies reshape students' writing practices. The findings therefore extend current theoretical debates by demonstrating that the influence of AI cannot be understood solely through questions of plagiarism or technological acceptance. Rather, AI alters the mechanisms through which students generate knowledge, regulate learning, and construct academic identities. This multidimensional framework fills an important gap in the literature and provides a conceptual foundation for future investigations into AI-mediated learning environments.

Although the findings generally support concerns regarding the risks of AI dependence, they also reveal important tensions within the broader literature. Several previous studies have argued that AI enhances writing quality, promotes self-directed learning, and increases students' confidence (Losi et al., 2024; Reis et al., 2023; Rahman et al., 2022). At first glance, these conclusions appear inconsistent with the present findings. However, such differences may stem from variations in research focus, educational context, and theoretical assumptions. Whereas earlier studies often emphasized the immediate benefits of AI for language accuracy and task completion, the present study examined the deeper cognitive processes underlying authentic academic writing. Moreover, most prior research concentrated on technological acceptance and learning outcomes, while comparatively little attention was given to the gradual redistribution of cognitive responsibility between students and intelligent systems. These differences suggest that the educational consequences of AI are highly context-dependent and cannot be reduced to a simple dichotomy between benefit and harm.

The Indonesian higher education context further enriches the interpretation of these findings. Conducted among English education students, this study reflects a learning environment in which digital literacy, institutional policies, and access to technological resources remain uneven. Previous scholarship has shown that educational technologies often produce different outcomes across social and cultural contexts, particularly in developing countries characterized by diverse levels of technological readiness (Costan et al., 2021; Akpan et al., 2024; Han & Kumwenda, 2025). In such settings, AI may simultaneously function as an instrument for expanding educational opportunities and as a catalyst for new forms of dependency. It is therefore possible that the moderate level of dependence observed in this study reflects students' attempts to balance the practical advantages of AI with their existing academic habits. Alternative explanations should also be considered, including disciplinary expectations, differences in prior writing experience, and institutional regulations governing AI use. Consequently, the relationship between AI and authentic academic writing must be understood as socially situated rather than universally determined.

Taken together, these findings challenge deterministic narratives that portray artificial intelligence as either an unquestionable educational solution or an inevitable threat to academic integrity. Instead, the study suggests that the authenticity of academic writing depends largely on how AI is positioned within pedagogical practice. This argument is consistent with recent studies emphasizing that technological innovation alone cannot improve education without appropriate instructional frameworks and critical engagement from learners (Bulathwela et al., 2024; Alemany-Arrebola et al., 2025; Hariyanto et al., 2025). The present study contributes to the global literature

by reframing authenticity not as the absence of AI, but as the preservation of intellectual ownership, reflective judgment, and self-regulatory capacity in AI-supported learning environments. From a practical perspective, universities should develop assessment strategies that encourage students to interrogate, evaluate, and refine AI-generated outputs rather than merely adopt them. Ultimately, the future of academic writing in higher education will depend not on rejecting artificial intelligence, but on ensuring that technological assistance strengthens rather than replaces the cognitive and reflective processes that define scholarly work.

CONCLUSION

This study reveals that artificial intelligence has become an integral part of students' academic writing practices, shaping the ways in which they generate ideas, construct arguments, revise texts, and evaluate their own work. Drawing on a convergent mixed-methods approach that combines survey data from English education students with a synthesis of contemporary scholarship, the findings indicate that students demonstrate a moderate yet consistent reliance on AI throughout the writing process. More importantly, the study identifies five interconnected dimensions of dependence: ideation dependence, language and structure dependence, revision and editing dependence, cognitive and metacognitive dependence, and loss of writing autonomy that collectively explain how AI influences the authenticity of academic writing. Rather than portraying AI as an inherently harmful technology, this study argues that the decline in authentic writing emerges when intelligent systems replace the cognitive, reflective, and self-regulatory processes that academic writing is intended to cultivate. Excessive reliance on AI may weaken students' intellectual ownership, critical engagement, and confidence in writing independently, even though AI continues to offer valuable support for linguistic and technical aspects of writing. The findings therefore contribute to current theoretical discussions on cognitive writing processes and human-AI collaboration while also providing practical implications for higher education institutions. Ultimately, preserving authentic academic writing in the age of artificial intelligence requires pedagogical strategies that position AI as a tool for supporting, rather than substituting for, students' thinking, creativity, and academic integrity.

AUTHOR CONTRIBUTIONS STATEMENT

Muhamad Yahrif conceived the study, formulated the research objectives, and designed the convergent mixed-methods framework employed in this research. Muhamad Yahrif and Suharti Sirajuddin conducted the data collection process, including the administration of the questionnaire survey and the systematic review of relevant literature on artificial intelligence and academic writing. Muhamad Yahrif developed the analytical framework, synthesized the quantitative and qualitative findings, and constructed the conceptual model explaining the progressive dimensions of students' dependence on AI in academic writing. Suharti Sirajuddin contributed to the validation of the research instruments and provided critical input on the theoretical and pedagogical perspectives underlying the study. Muh. Khaedar contributed to data curation, literature analysis, and the interpretation of the findings. Muhamad Yahrif and Muh. Khaedar prepared the original manuscript draft, while all authors participated in reviewing and revising the manuscript, approved the final version for publication, and agreed to be accountable for all aspects of the work.

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