

The Role of AI in Developing Academic Writing Competence: A Cross-Institutional Analysis of Higher Education

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Abstract

This study investigates the role of artificial intelligence (AI) in developing academic writing competence among English education students in higher education. Employing a comparative mixed-methods design, the research involved first-semester students from UIN Bukittinggi and Universitas Rokania during the 2025–2026 academic year. Data were collected through pre- and post-writing tests, a Technology Acceptance Model (TAM)-based survey, and semi-structured interviews. Quantitative findings reveal significant improvements in students' academic writing performance in both institutions, with an average score increase of 12.2 points at UIN Bukittinggi and 7.9 points at Universitas Rokania. Improvements were evident in grammatical accuracy, argumentative coherence, and citation accuracy. Qualitative results indicate that students who received structured AI literacy training engaged more critically with AI feedback, while students without institutional guidance tended to rely passively on AI output. The findings demonstrate that AI-assisted writing is most effective when supported by institutional policies, pedagogical scaffolding, and ethical guidance. This study contributes to the growing discourse on responsible AI integration in academic writing instruction in higher education.

Keywords: Artificial Intelligence, Academic Writing, AI literacy, Higher Education, Mixed-Methods

Introduction

Academic writing competence is a fundamental learning outcome in English language education at the tertiary level, as it enables students to participate in scholarly discourse and contribute to knowledge production within their academic communities. Mastery of academic writing involves not only linguistic accuracy but also the ability to construct coherent arguments, synthesize sources, and apply appropriate academic conventions (Hyland, 2022; Ferris & Hedgcock, 2021). Nevertheless, many undergraduate students, particularly those in their first year

of study, experience persistent difficulties in meeting these demands. Such challenges are frequently associated with limited prior exposure to academic genres, insufficient feedback, and a lack of explicit instruction in academic writing strategies

These challenges are especially evident in English as a Foreign Language (EFL) contexts, including Indonesia, where students often enter higher education with uneven writing proficiency and minimal experience in scholarly writing practices (Marzuki et al., 2023; Li & Zhang, 2021). In this context, academic writing instruction requires pedagogical approaches that not only address surface-level linguistic errors but also foster higher-order thinking skills, critical engagement with sources, and disciplinary conventions. As a result, educators have increasingly turned to digital technologies to support the development of students' academic writing competence.

The rapid advancement of digital technology, particularly artificial intelligence (AI), has introduced new possibilities for writing instruction and feedback provision. AI-powered writing tools such as Grammarly, ChatGPT, and automated writing evaluation (AWE) systems are designed to provide immediate feedback on grammar, vocabulary, coherence, and textual organization (Burstein et al., 2019; Dwivedi et al., 2023). Empirical studies suggest that AI-assisted writing tools can improve learners' grammatical accuracy, fluency, and confidence in writing, especially when used as supplementary learning resources (Wu & Li, 2022; Bai et al., 2021).

Despite these potential benefits, the integration of AI in academic writing instruction has also raised pedagogical and ethical concerns. Scholars have warned that uncritical reliance on AI-generated feedback may reduce students' cognitive engagement, weaken their authorial voice, and blur the boundaries of academic integrity (Pecorari, 2015; O'Neill, 2020). Recent studies emphasize that the educational value of AI-assisted writing depends largely on how students engage with feedback and how instructors scaffold AI use within pedagogical frameworks (Ranalli, 2021; Yang et al., 2024). Without explicit guidance, AI tools may function merely as correction devices rather than as instruments for meaningful learning.

Institutional context plays a crucial role in shaping students' engagement with AI-assisted writing tools. Universities that provide clear policies, ethical guidelines, and AI literacy training tend to foster more reflective and responsible use of AI technologies (Adams et al., 2023; Kohnke & Moorhouse, 2023). Conversely, in institutions where AI use is largely unguided, students may rely on AI output passively, potentially limiting learning gains and increasing the risk of misuse. However, empirical research examining how institutional differences influence the effectiveness of AI-assisted academic writing remains limited, particularly in the Indonesian higher education context.

Existing studies on academic writing instruction in Indonesia have predominantly focused on specific pedagogical techniques or have been conducted within single-institution settings, such as research on outlining techniques and their impact on students' writing performance at the secondary education level (Existing studies on academic writing instruction in Indonesia have predominantly focused on specific pedagogical techniques or instructional designs and have largely been conducted within single-institution settings. For instance, Agustina and Widyaningsih (2023) examined the impact of outlining techniques on seventh-grade students'

writing performance, highlighting the effectiveness of structured pre-writing strategies in improving textual organization. Similarly, Wardhani (2023) investigated the concept of AI-resistant assignments in writing classes based on insights from Australian higher education websites, emphasizing institutional efforts to mitigate overreliance on AI-generated content through assessment design. While these studies offer valuable contributions to writing pedagogy and academic integrity discourse, they do not empirically examine how students engage with AI tools in the process of developing academic writing competence, nor do they employ comparative mixed-methods approaches across higher education institutions.

Consequently, there remains a notable lack of empirical research that integrates AI-assisted writing practices with institutional policy analysis and pedagogical scaffolding within the Indonesian higher education context. Addressing this gap, the present study aims to examine the role of AI in developing academic writing competence through a cross-institutional analysis of UIN Bukittinggi and Universitas Rokania. By comparing institutions with differing approaches to AI integration, this study seeks to contribute empirical evidence to the ongoing discourse on responsible, pedagogically sound, and context-sensitive AI use in academic writing instruction.

Method

This study employed a comparative mixed-methods design to obtain a comprehensive understanding of the impact of AI-assisted writing on students' academic writing competence. The mixed-methods approach was selected to integrate quantitative measurement of writing performance with qualitative insights into students' engagement and perceptions, thereby providing a more holistic interpretation of the research findings (Creswell & Poth, 2018; Schroeder & Adesope, 2019). A comparative design was considered appropriate as it allowed systematic examination of similarities and differences in AI-assisted writing practices across institutional contexts.

The participants consisted of 18 first-semester students enrolled in English Education programs, including 10 students from UIN Bukittinggi and 8 students from Universitas Rokania. Purposive sampling was applied to ensure that participants shared relatively comparable academic backgrounds and levels of prior writing experience, which is recommended in small-scale comparative educational research (Cohen et al., 2018).

Research instruments included pre- and post-writing tests, a survey questionnaire adapted from the Technology Acceptance Model (TAM) (Davis, 1989), and semi-structured interview guidelines. The use of pre- and post-tests enabled the measurement of learning gains attributable to the intervention, a common practice in writing research (Ferris & Hedgcock, 2021). Writing performance was assessed using an analytic rubric covering argumentative structure, citation accuracy, grammatical accuracy, and academic style, following established principles of analytic writing assessment (Hyland, 2022).

To ensure scoring reliability, two independent raters evaluated the writing samples, and inter-rater reliability was calculated using the Intraclass Correlation Coefficient (ICC). An ICC value of 0.89 indicated a high level of consistency between raters, exceeding the acceptable threshold for educational research (Koo & Li, 2016).

The intervention was conducted over a 12-week period during the odd (first) semester of the 2025–2026 academic year. Students at UIN Bukittinggi received structured AI literacy training and institutional guidelines on responsible AI use, whereas students at Universitas Rokania utilized AI tools independently without formal training. Such differentiated instructional conditions align with recommendations for examining pedagogical interventions in technology-enhanced learning research (Bai et al., 2021; Ranalli, 2021).

Quantitative data were analyzed using descriptive statistics and paired-sample t-tests to identify differences between pre- and post-intervention writing scores. This statistical procedure is appropriate for small-sample educational studies seeking to determine instructional effects (Field, 2018). Qualitative data from interviews were analyzed thematically to identify recurring patterns related to students' engagement with AI feedback and perceptions of learning, following established qualitative analysis procedures (Braun & Clarke, 2006).

Result and Discussion

The quantitative findings demonstrate that AI-assisted writing instruction led to measurable improvements in students' academic writing competence at both institutions. However, the magnitude of improvement differed notably between UIN Bukittinggi and Universitas Rokania. Students at UIN Bukittinggi achieved a higher mean score increase (12.2 points) compared to their counterparts at Universitas Rokania (7.9 points). This finding aligns with previous studies indicating that AI-assisted writing tools can enhance students' writing performance when integrated into instructional settings (Wu & Li, 2022; Marzuki et al., 2023). However, the present study extends prior research by demonstrating that the effectiveness of AI-assisted writing is not uniform across contexts but is strongly mediated by institutional policies and pedagogical support.

A closer examination of the analytic scoring rubric reveals that the most substantial gains at UIN Bukittinggi occurred in higher-order writing components, particularly argumentative coherence and citation accuracy. Similar improvements in higher-order writing skills have been reported in studies emphasizing guided feedback and structured instructional support (Bai et al., 2021; Ranalli, 2021). In contrast, students at Universitas Rokania showed more pronounced improvement in surface-level features such as grammatical accuracy and sentence structure. This pattern is consistent with findings by Li and Zhang (2021) and Al-Zahrani (2022), who observed that unguided use of automated writing evaluation tools tends to benefit lower-level linguistic accuracy rather than deeper rhetorical development.

From a pedagogical perspective, the higher performance gains at UIN Bukittinggi can be attributed to the presence of institutional scaffolding, including explicit training on how to interpret, evaluate, and revise AI-generated feedback. This finding corroborates earlier research suggesting that technology-enhanced feedback is most effective when embedded within a guided learning framework rather than used as an autonomous corrective tool (Bai et al., 2021; Schroeder & Adesope, 2019). In contrast to studies that report mixed or limited learning outcomes from unstructured AI use (O'Neill, 2020), the present study demonstrates that structured AI literacy training can mitigate risks related to overreliance and superficial engagement.

The qualitative interview data further illuminate differences in students' engagement with AI feedback across institutions. Students at UIN Bukittinggi reported actively questioning AI

suggestions, cross-checking grammatical corrections, and revising arguments based on both AI feedback and lecturer guidance. This reflective engagement reflects the development of AI literacy, a concept increasingly emphasized in recent literature on responsible AI integration in education (Kohnke & Moorhouse, 2023; Adams et al., 2023). Conversely, several students at Universitas Rokania acknowledged accepting AI-generated revisions with minimal evaluation, particularly in relation to paraphrasing and citation formatting. This tendency supports concerns raised by Pecorari (2015) and O'Neill (2020) regarding the potential erosion of academic integrity and critical thinking when AI tools are used without adequate pedagogical mediation.

In comparison with earlier studies that primarily focus on learners' perceptions of AI tools (Al-Zahrani, 2022; Li & Zhang, 2021), the present research provides empirical evidence linking AI use to measurable writing outcomes and institutional practices. Moreover, unlike prior single-institution studies (Marzuki et al., 2023), this study adopts a cross-institutional perspective, allowing for a more nuanced understanding of how contextual factors influence the pedagogical effectiveness of AI-assisted writing.

Despite these contributions, the present study is subject to several limitations. First, the sample size was relatively small and limited to first-semester students from two institutions, which may restrict the generalizability of the findings. Second, the duration of the intervention was confined to a single academic semester, preventing analysis of long-term impacts of AI-assisted writing instruction on students' writing development. Third, this study focused primarily on academic writing performance and did not examine other potential outcomes such as students' motivation, metacognitive awareness, or disciplinary writing differences.

Notwithstanding these limitations, the findings offer important implications for scientific and pedagogical development. From a theoretical perspective, this study contributes to the literature on AI-assisted writing by highlighting the mediating role of institutional context and pedagogical scaffolding in shaping learning outcomes. From a practical standpoint, the results suggest that higher education institutions should not merely permit or prohibit AI use, but should design structured AI literacy programs and ethical guidelines to support meaningful learning. Finally, from a policy perspective, this study provides empirical support for the development of context-sensitive AI integration frameworks that balance technological innovation with academic integrity and educational responsibility.

Conclusion

This study demonstrates that AI-assisted writing tools can significantly enhance students' academic writing competence; however, their effectiveness is strongly influenced by institutional context and pedagogical strategies. Structured integration of AI, supported by literacy training and ethical guidance, results in more consistent and meaningful learning outcomes. Therefore, higher education institutions are encouraged to develop policies and curricula that integrate AI critically and responsibly to support sustainable academic writing development in the digital era.

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