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ARTIFICIAL INTELLIGENCE IN ADULT ACADEMIC WRITING: EFFECTS ON WRITING QUALITY AND COGNITIVE AUTHENTICITY

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Abstract : *The integration of artificial intelligence (AI) in adult academic writing is rapidly transforming how adult students produce, organize, and evaluate written work. This study examines how AI use affects text structure quality and cognitive authenticity, with attention to metacognitive self-regulation and ethical awareness. A mixed-methods approach was employed, combining survey data, pre–post writing comparisons, regression analysis, and qualitative interviews. The findings reveal that artificial intelligence significantly improves text structure quality by enhancing coherence, organization, and linguistic accuracy. The improvement is accompanied by a decline in cognitive authenticity, reflected in reduced originality, weaker authorial voice, and lower reflective depth. Regression results indicate that artificial intelligence engagement positively predicts structural quality but negatively affects authenticity. In contrast, metacognitive self-regulation, and ethical awareness function as protective factors, supporting both critical engagement and intellectual ownership. Qualitative findings further confirm that adult students experience artificial intelligence as both a structural support and a source of cognitive dependency.*

Keywords : *Artificial Intelligence; Academic Writing; Cognitive Authenticity; Ethical Awareness.*

Abstrak : *Integrasi kecerdasan buatan dalam penulisan akademik bagi pembelajar dewasa dengan cepat mengubah cara mahasiswa dewasa dalam menghasilkan, mengorganisasi, dan mengevaluasi karya tulis. Penelitian ini mengkaji bagaimana penggunaan AI memengaruhi kualitas struktur teks dan autentisitas kognitif, dengan memperhatikan regulasi diri metakognitif dan kesadaran etis. Pendekatan metode campuran digunakan dengan mengombinasikan data survei, perbandingan tulisan sebelum dan sesudah, analisis regresi, serta wawancara kualitatif. Hasil penelitian menunjukkan bahwa kecerdasan buatan secara signifikan meningkatkan kualitas struktur teks melalui peningkatan koherensi, organisasi, dan akurasi linguistik. Peningkatan tersebut disertai dengan penurunan autentisitas kognitif, yang tercermin dalam berkurangnya orisinalitas, melemahnya suara penulis, dan menurunnya kedalaman reflektif. Hasil analisis regresi menunjukkan bahwa keterlibatan dengan kecerdasan buatan berpengaruh positif terhadap kualitas struktural, tetapi berdampak negatif terhadap autentisitas. Sebaliknya, regulasi diri metakognitif dan kesadaran etis berfungsi sebagai faktor protektif yang mendukung keterlibatan kritis sekaligus mempertahankan kepemilikan intelektual. Temuan kualitatif semakin menegaskan bahwa mahasiswa dewasa memandang kecerdasan buatan sebagai sarana pendukung dalam membangun struktur tulisan sekaligus sebagai sumber ketergantungan kognitif.*

Kata Kunci : *Kecerdasan Buatan; Penulisan Akademik; Otentisitas Kognitif; Kesadaran Etis.*

INTRODUCTION

Generative artificial intelligence (GenAI) has rapidly transformed academic writing in higher education, reshaping how students generate ideas, structure arguments, and produce scholarly texts. Tools such as ChatGPT, Gemini, and Copilot now enable students to perform complex writing tasks—including outlining, drafting, revising, and linguistic refinement—with unprecedented efficiency. Empirical studies consistently show that GenAI enhances writing quality by improving coherence, organization, grammar, and stylistic clarity, while also supporting brainstorming and iterative feedback processes (Nurhayati et al., 2026; Wang & Ren, 2024). These benefits are particularly salient for learners requiring linguistic scaffolding, as AI can reduce barriers to participation and increase confidence in academic writing (Liao & Lee, 2025; Park, 2025; Sok et al., 2025). However, alongside these advantages, concerns have emerged regarding the potential erosion of originality, authorial voice, and independent reasoning in AI-assisted writing. As a result, GenAI is increasingly positioned not merely as a technical tool but as an active mediator in academic meaning-making.

However, the growing integration of GenAI has raised fundamental questions about learning, authorship, and intellectual development. While AI-assisted writing improves efficiency and surface-level performance, its impact on deeper cognitive processes remains contested. Writing is widely understood as a complex cognitive activity involving planning, knowledge transformation, and reflective decision-making rather than simple transcription (Galbraith & Al-Saadi, 2020; Taufikin et al., 2025). From this perspective, GenAI presents a pedagogical paradox: it can reduce cognitive load and enhance text structure, yet it may also externalize or displace the processes through which students develop critical thinking and authentic voice (Jiang, 2024; Himmi et al, 2026; Manshur & Rozi, 2025). Recent studies highlight risks such as cognitive dependency, reduced originality, and ethical ambiguity, particularly when AI outputs are adopted without critical evaluation (Espino et al., 2025; Guadu et al., 2026; Ruskulis et al., 2026).

To address these risks, the literature highlights two key mechanisms: metacognitive self-regulation and ethical awareness. Metacognitive self-regulation enables learners to plan, monitor, and evaluate their use of AI, thereby transforming it from a productivity tool into a reflective learning partner (Sohail et al., 2025; Yang, 2026; Makena & Mpiti, 2024). Ethical awareness, in turn, guides responsible engagement by clarifying issues of authorship, transparency, and academic integrity in AI-mediated environments (Amini et al., 2025; Cardon et al., 2023; Dabis & Csáki, 2024). These mechanisms are increasingly recognized as critical in determining whether AI use supports or undermines meaningful learning outcomes.

Despite growing scholarship on AI-assisted writing, an important conceptual and empirical gap remains. Existing studies have examined writing quality, critical thinking, self-regulated learning, and ethical concerns, yet these dimensions are typically investigated as separate outcomes rather than as interconnected processes. Consequently, current evidence explains whether AI improves performance or raises cognitive concerns, but provides limited understanding of how these effects coexist within the same writing experience. This study argues that such separation obscures a critical educational tension: artificial intelligence may simultaneously strengthen structural writing performance while weakening cognitive authenticity. To address this limitation, the present study integrates writing performance, cognitive authenticity, metacognitive self-regulation, and ethical awareness within a single analytical framework. Rather than treating these variables as parallel constructs, the study examines how they interact to shape AI-assisted academic writing outcomes. Empirically, the study extends existing literature by directly comparing student writing before and after AI use while combining quantitative and qualitative evidence. It further contributes evidence from a non-Western higher education context, where research remains comparatively limited. By positioning structural quality and cognitive authenticity as interrelated rather than independent outcomes, this study advances a more integrated understanding of how AI reshapes adult academic writing.

This study addresses this gap by investigating the effects of GenAI on two interrelated dimensions of academic writing: Text Structure Quality and Cognitive Authenticity. It further examines how AI Writing Engagement, Metacognitive Self-Regulation, and AI Ethical Awareness interact to influence these outcomes. By focusing on the tension between writing performance and cognitive authenticity, this study positions these additional variables as explanatory factors rather than parallel constructs. The study is guided by three research questions: 1) to what extent does GenAI improve the structural quality of academic writing; 2) how do AI engagement, metacognitive self-regulation, and ethical awareness relate to cognitive authenticity; and 3) how do students interpret changes in their authorial voice and academic identity after using AI?

The study hypothesizes that AI Writing Engagement positively predicts Text Structure Quality but may negatively predict Cognitive Authenticity, while Metacognitive Self-Regulation and AI Ethical Awareness function as protective factors. The primary contribution of this research lies in its integrative mixed-methods design, its direct pre–post comparison of student writing, and its focused examination of the relationship between structural performance and cognitive authenticity in AI-assisted writing. Rather than proposing a definitive model, this study offers an initial conceptual integration—referred to as the AI–Metacognitive–Authenticity Model (AIMAM)—to interpret the observed

relationships. This contribution supports ongoing discussions on AI literacy, writing pedagogy, and the development of authentic learning in higher education.

METHOD

This study employed a sequential explanatory mixed-methods design to examine the effects of artificial intelligence on writing quality and cognitive authenticity in adult academic writing. The design consisted of two phases: 1) a quantitative phase to test relationships among key variables, and 2) a qualitative phase to explain and contextualize the statistical findings. The qualitative phase was used to interpret and elaborate the quantitative results.

Participants were 250 adult learners enrolled in higher education programs who had prior experience using artificial intelligence in academic writing. A purposive sampling strategy was applied to ensure that all participants met the inclusion criteria of active AI usage. From this sample, 25 participants were further selected for semi-structured interviews using maximum variation sampling based on discipline and level of AI usage to capture diverse experiences.

Data were collected using a structured questionnaire and writing performance assessment. The questionnaire measured five constructs: AI Writing Engagement (AIWE), Text Structure Quality (TSQ), Cognitive Authenticity (CA), Metacognitive Self-Regulation (MSR), and AI Ethical Awareness (AIEA) using a five-point Likert scale. The instrument was developed based on relevant literature on AI use, self-regulated learning, and academic integrity, with each construct operationalized into multiple indicators. Writing performance was evaluated through pre–post writing samples, assessed using a standardized rubric focusing on coherence, organization, originality, and depth of reasoning.

Data collection was conducted in three stages. *First*, participants completed the questionnaire. *Second*, participants submitted writing samples produced before and after using AI tools. *Third*, semi-structured interviews were conducted to explore participants' experiences, perceptions, and decision-making processes when using AI in writing. All procedures were conducted within the same academic course setting to maintain consistency of task and context. Quantitative data were analyzed using descriptive statistics, paired-sample t-tests, and multiple regression analysis to examine the effects of AIWE, MSR, and AIEA on TSQ and CA. Statistical analyses were performed using SPSS version 25, with significance set at $p < 0.05$. Qualitative data were analyzed using thematic analysis, involving open coding, categorization, and theme development. Integration of findings was conducted by comparing and linking quantitative and qualitative results.

Instrument reliability was assessed using Cronbach's alpha coefficients, and all constructs met acceptable thresholds. Construct validity was supported through alignment of indicators with theoretical constructs. Pre–post writing assessment was conducted using consistent scoring criteria. Ethical approval was obtained prior to data collection, and participants provided informed consent.

RESULT AND DISCUSSION

1. Results

This section presents the empirical findings derived from a multi-method data corpus comprising survey responses, document-based writing analysis, and in-depth qualitative interviews. A total of 250 undergraduate students participated in the quantitative phase, while 25 students were purposively selected for the qualitative phase. Both data sources are reported to provide complementary evidence. Participants were drawn from diverse disciplinary backgrounds, including Islamic Education (30%), Arabic Language (20%), Islamic Educational Management (25%), and Islamic Economics (25%). The gender distribution was 60% female and 40% male. With regard to AI usage, 82% of respondents reported engaging with generative AI tools more than three times in academic writing contexts, while 18% indicated limited exposure. ChatGPT was the dominant platform (71%), followed by Gemini (17%), with smaller proportions using Copilot and BingAI.

In terms of functional use, AI was most frequently employed for outline generation (76%), sentence construction (68%), grammatical refinement (59%), and reference identification (42%). Only 11% of participants reported explicitly disclosing AI usage in their academic work. Descriptive statistics for the principal constructs are presented in Table 1.

Table 1: Descriptive Statistics of Key Variables

Variable	Mean	SD	Scale	Interpretation
AIWE	4.21	0.54	1–5	High
AIEA	3.18	0.72	1–5	Moderate
MSR	3.64	0.67	1–5	Moderately High
TSQ	4.05	0.49	1–5	High
CA	3.12	0.62	1–5	Moderate

The descriptive profile shows that AI Writing Engagement (AIWE) and Text Structure Quality (TSQ) have higher mean scores, while AI Ethical Awareness (AIEA) and Cognitive Authenticity (CA) show comparatively lower mean values see Figure 1.

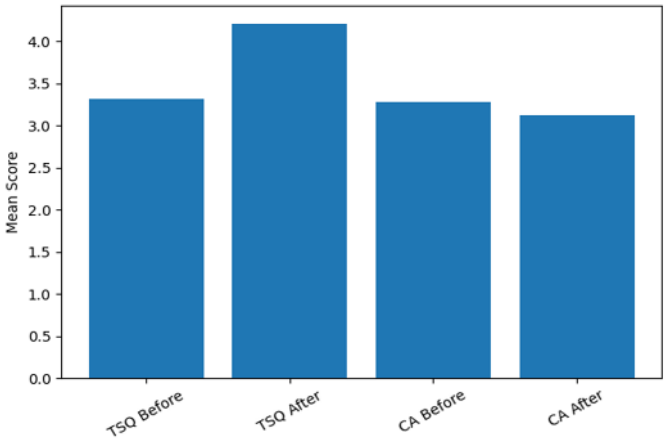

Figure 1: Pre–post comparison of Text Structure Quality (TSQ) and Cognitive Authenticity (CA).

1) Pre–Post Writing Comparison

To assess the causal impact of AI on writing outcomes, a paired-sample document analysis was conducted comparing texts produced before and after AI-assisted writing. This within-subject design isolates the effect of AI use while controlling for individual differences. The results are presented in Table 2.

Table 2: Pre–Post Comparison of Writing Quality

Aspect	Before AI (Mean ± SD)	After AI (Mean ± SD)	Δ	t	p	Interpretation
TSQ	3.32 ± 0.58	4.21 ± 0.47	+0.89	12.45	0.000	Significant Increase
CA	3.28 ± 0.63	3.12 ± 0.59	−0.16	−3.18	0.002	Significant Decrease
AI Detection (%)	27.4 ± 12.1	61.8 ± 17.5	+34.4	14.87	0.000	Significant Increase

The results indicate a substantial and statistically significant improvement in TSQ, confirming that AI enhances structural coherence, logical sequencing, and adherence to academic conventions. From a cognitive load perspective, this suggests that AI externalizes organizational demands, thereby enabling students to produce more formally refined outputs with reduced effort. Conversely, a statistically significant decline in CA is observed, indicating reduced originality, diminished authorial voice, and lower reflective depth. The increase in AI detection scores further

suggests that texts become more standardized and aligned with machine-generated patterns. Importantly, this does not simply reflect deterioration in quality, but rather a redistribution of cognitive effort, where students delegate key aspects of idea generation and organization to AI systems.

2) Regression Analysis: Predictors of Text Structure Quality (TSQ)

A multiple regression model was employed to examine the predictive relationships between AI Writing Engagement (AIWE), AI Ethical Awareness (AIEA), and Metacognitive Self-Regulation (MSR) in relation to Text Structure Quality (TSQ). The model was statistically significant ($F = 52.48$, $p < 0.001$) and accounted for 61% of the variance ($R^2 = 0.61$), indicating a strong explanatory capacity and suggesting that these variables collectively provide a robust account of structural writing performance in AI-assisted contexts. Table 3 present the data of regression model of text structure quality (TSQ).

Table 3: Regression Model for TSQ

Predictor	β	t	p	Interpretation
AIWE	0.482	8.61	0.000	Significant (+)
AIEA	0.121	1.88	0.061	Not Significant
MSR	0.214	3.75	0.000	Significant (+)

AIWE emerges as the most influential predictor of TSQ, with a large and highly significant coefficient ($\beta = 0.482$, $p < 0.001$). This finding reinforces the conceptualization of AI as a structural scaffold that enhances formal aspects of writing, including coherence, logical sequencing, and adherence to disciplinary conventions. The magnitude of this effect suggests that AI engagement substantially reduces the cognitive burden associated with organizing complex ideas, thereby enabling students to produce structurally sophisticated texts even in the absence of advanced writing expertise. MSR also demonstrates a statistically significant positive effect ($\beta = 0.214$, $p < 0.001$), indicating that students who actively engage in planning, monitoring, and evaluating their writing processes are better able to integrate AI-generated outputs into coherent and meaningful structures. This suggests that metacognitive regulation enhances the functional use of AI by transforming passive consumption into active cognitive engagement. In this sense, MSR does not merely support writing quality directly but amplifies the effectiveness of AI as a cognitive tool. In contrast, AIEA does not reach statistical significance ($\beta = 0.121$, $p = 0.061$), indicating that ethical awareness does not directly influence structural writing performance.

3) Regression Analysis: Predictors of Cognitive Authenticity (CA)

A second regression analysis was conducted to examine the predictors of Cognitive Authenticity (CA). The model was statistically significant ($F = 41.22$, $p < 0.001$) and explained 52% of the variance ($R^2 = 0.52$), indicating a substantial explanatory contribution of the independent variables.

Table 4: Regression Model for CA

Predictor	β	t	p	Interpretation
AIWE	−0.261	−4.02	0.000	Significant (−)
AIEA	0.305	5.47	0.000	Significant (+)
MSR	0.289	4.76	0.000	Significant (+)

The data in Table 4 reveals that AIWE exerts a significant negative effect on CA ($\beta = -0.261$, $p < 0.001$), providing strong empirical support for the cognitive outsourcing hypothesis. This suggests that increased reliance on AI is associated with diminished engagement in independent reasoning, reduced originality, and weaker authorial voice. In effect, as students delegate cognitive tasks to AI systems, their own involvement in knowledge construction and transformation may become attenuated. Conversely, both AIEA ($\beta = 0.305$, $p < 0.001$) and MSR ($\beta = 0.289$, $p < 0.001$) demonstrate strong positive effects on CA. These findings indicate that ethical awareness and metacognitive regulation function as critical protective mechanisms that sustain authenticity in AI-assisted writing. Students who are both ethically conscious and cognitively reflective are more likely to critically evaluate AI-generated content, adapt it to their own perspectives, and maintain intellectual ownership of their work. Importantly, the relative strength of AIEA as a predictor suggests that ethical awareness is not merely a normative consideration but a substantive cognitive factor influencing writing authenticity. This highlights the role of moral reasoning in shaping how students engage with AI, particularly in distinguishing between assistance and substitution. Taken together, these results underscore that the cognitive consequences of AI are not inherently deterministic but are contingent upon internal regulatory capacities. While AI can potentially undermine authenticity, this effect can be mitigated—or even reversed—when students engage with AI in a reflective and ethically grounded manner.

4) Qualitative Findings

Thematic analysis of interview data yielded four major themes that provide nuanced and multilayered insight into students' lived experiences of AI-assisted writing. Beyond merely corroborating the quantitative findings, these themes

illuminate the underlying cognitive, affective, and ethical processes that mediate students' interactions with AI tools. The qualitative data thus serve not only as confirmatory evidence but also as an interpretive lens through which the complexity of AI-mediated writing practices can be more fully understood. In particular, the narratives reveal how students negotiate tensions between efficiency and authenticity, automation and agency, as well as performance and responsibility in their academic writing processes.

Participants consistently described AI as a facilitative and enabling tool that enhances organization, coherence, and clarity in academic writing. Many students emphasized that AI helped them overcome initial barriers in structuring arguments, particularly during the planning and drafting stages. For instance, several respondents noted that AI-generated outlines provided a "starting framework" that reduced uncertainty and accelerated the writing process. This aligns closely with the quantitative evidence demonstrating significant improvements in TSQ and reinforces the conceptualization of AI as an external cognitive scaffold. From a theoretical perspective, this finding resonates with cognitive load theory, suggesting that AI offloads organizational demands, thereby freeing cognitive resources for higher-order thinking. However, this benefit is not uniformly experienced; some students reported becoming increasingly dependent on AI-generated structures, indicating a potential shift from scaffolding toward substitution when reflective engagement is limited.

A recurring and emotionally salient concern among participants was the perceived erosion of personal voice and intellectual ownership. Students frequently expressed that their writing felt less "authentic," "personal," or "representative of their thinking" when heavily influenced by AI-generated content. Some participants articulated a sense of detachment from their own work, describing the final output as "technically correct but not truly mine." This experiential account provides strong qualitative support for the observed decline in CA and highlights the affective dimension of cognitive authenticity. Importantly, this theme suggests that authenticity is not only a cognitive construct but also an identity-related phenomenon, where students' sense of authorship and agency becomes destabilized in AI-mediated environments. Such findings point to a deeper epistemological concern regarding the ownership of knowledge and the integrity of intellectual labor.

Many participants acknowledged a tendency to accept AI-generated suggestions with minimal critical evaluation. This pattern reflects a reduction in metacognitive engagement, where students bypass essential processes such as reflection, revision, and meaning-making. Several respondents admitted that they

often relied on AI outputs "as-is," particularly under time pressure, without interrogating the accuracy, relevance, or conceptual alignment of the content. This behavior exemplifies the mechanism of cognitive outsourcing, wherein core cognitive functions are delegated to external systems. From a pedagogical standpoint, this raises concerns about the erosion of self-regulated learning processes, as students may become passive recipients rather than active constructors of knowledge. Nevertheless, it is important to note that not all students exhibited this pattern; those with higher levels of MSR reported engaging more critically with AI outputs, suggesting variability in how AI is cognitively integrated.

Students demonstrated considerable uncertainty regarding the ethical boundaries governing AI use in academic writing. Questions surrounding authorship, originality, attribution, and disclosure were frequently raised, indicating that ethical norms are not yet fully internalized or consistently communicated. Some participants expressed confusion about whether AI assistance constitutes plagiarism, while others viewed it as a legitimate tool akin to spell-checkers or grammar aids. This ambiguity reflects the moderate levels of AIEA observed in the quantitative data and underscores the absence of clear, widely understood institutional guidelines. Furthermore, the data suggest that ethical awareness is often situational rather than principled, with students making ad hoc judgments based on perceived expectations rather than established standards. This highlights the urgent need for explicit ethical frameworks and educational interventions that promote responsible and transparent AI use. Taken together, these qualitative findings provide rich phenomenological validation of the quantitative trends, revealing that the structural benefits of AI are accompanied by complex cognitive and ethical trade-offs. They demonstrate that the impact of AI on academic writing is not merely technical but deeply embedded in students' cognitive strategies, emotional experiences, and moral reasoning processes.

The integration of quantitative and qualitative findings reveals a coherent and theoretically significant pattern. AI enhances structural aspects of writing while simultaneously introducing risks to cognitive authenticity. This dual effect constitutes a structural–authenticity paradox, in which improvements in observable performance coexist with potential declines in deeper cognitive engagement. Crucially, metacognitive self-regulation and ethical awareness emerge as key mechanisms that shape this relationship. Their presence enables students to leverage AI as a supportive tool while maintaining critical engagement and intellectual ownership. In contrast, their absence increases the likelihood of cognitive dependency and superficial learning. These integrated findings provide empirical support for the AI–

Metacognitive–Authenticity Model (AIMAM), which conceptualizes writing quality as the outcome of dynamic interactions among technological engagement, reflective regulation, and ethical awareness. The model underscores that the educational value of AI is not determined solely by its technical capabilities but by how it is situated within a broader cognitive and ethical framework. In this sense, AI-assisted writing represents not merely a technological shift but a fundamental transformation in the ecology of learning, where human cognition, moral reasoning, and digital tools are increasingly intertwined.

2. Discussion

This study demonstrates that generative artificial intelligence (GenAI) fundamentally reconfigures adult academic writing through a pattern in which improvements in text structure quality coexist with declines in cognitive authenticity. This finding provides a direct answer to the study's central question by showing that gains in writing performance are accompanied by changes in how students engage cognitively with their work.. While prior studies consistently report improvements in writing quality, coherence, and linguistic accuracy through AI-supported revision and feedback (Ekizoğlu & Demir, 2025; Hou et al., 2025; Reis et al., 2023; Wang & Ren, 2024), the present findings extend this literature by indicating that these improvements occur alongside reduced indicators of originality and authorial voice. Importantly, this pattern suggests that improvements in observable writing outcomes should not automatically be interpreted as evidence of deeper learning. Instead, the findings indicate that writing quality and cognitive engagement may follow different trajectories under AI-supported conditions.

The positive effect of AI Writing Engagement (AIWE) on Text Structure Quality (TSQ) indicates that GenAI supports improvements in organization and coherence. This pattern can be explained through cognitive load theory, where external tools reduce the burden of lower-level processes such as grammar and structuring, allowing learners to focus on higher-level organization. This finding is consistent with recent studies showing that AI-assisted writing enhances formal aspects of text production (Corrales, 2025; Karimi & Qadir, 2025). However, the effectiveness of this support depends on how learners engage with AI, particularly whether they actively regulate its use. The present findings suggest that AI does not simply improve writing performance; rather, it redistributes cognitive effort across human and technological systems. From this perspective, structural improvement may reflect procedural efficiency rather than deeper conceptual elaboration. This interpretation offers a more nuanced understanding of AI-

supported writing by distinguishing between enhanced textual performance and sustained cognitive engagement.

In contrast, the negative relationship between AIWE and Cognitive Authenticity (CA) indicates that increased AI use is associated with reduced originality and authorial voice. This finding suggests that some learners rely on AI-generated content without extensive modification or reflection. Similar patterns have been reported in recent studies, where AI-assisted writing results in linguistically accurate but less conceptually developed texts (Espino et al., 2025). Qualitative data further support this result, with participants reporting that their writing felt less personal or representative of their own thinking. These results align with and extend prior scholarship that conceptualizes AI as a dual-use educational technology. Existing studies argue that AI enhances creativity, idea generation, and revision when used reflectively, but may reduce critical thinking and originality under conditions of over-reliance (Fernandes et al., 2025; L. N. A. Nguyen & Pham, 2025). The present findings extend this perspective by demonstrating that both positive and negative effects can occur simultaneously within the same writing process. Scientifically, this suggests that authenticity loss should not be interpreted solely as an ethical issue but also as a cognitive phenomenon linked to the externalization of idea generation, reflective revision, and meaning construction.

A central finding of this study is the role of metacognitive self-regulation (MSR). The positive effects of MSR on both TSQ and CA indicate that learners who actively plan, monitor, and evaluate their writing are better able to use AI effectively. This supports self-regulated learning theory, which emphasizes the importance of active control over learning processes in technology-supported environments (Ali, 2026; Shi et al., 2025). Students with higher MSR reported greater engagement in revising and adapting AI outputs rather than using them directly. This finding contributes theoretically by suggesting that metacognition functions not only as a learning strategy but also as a regulatory mechanism that determines whether AI operates as cognitive support or cognitive substitution. In this sense, the educational value of AI appears contingent upon learners' capacity to remain cognitively active throughout the writing process.

The role of AI Ethical Awareness (AIEA) shows a different pattern. While it does not significantly affect structural quality, it has a strong positive relationship with cognitive authenticity. This indicates that students with higher ethical awareness are more likely to evaluate and adapt AI-generated content rather than adopting it directly. This finding is consistent with recent studies highlighting the importance of ethical understanding in AI-assisted writing (Amini et al., 2025; Cardon et al., 2023; Dabis & Csáki, 2024). Theoretically, this finding suggests that ethical awareness should not be

viewed merely as compliance with academic integrity norms but as an epistemic mechanism that shapes how learners negotiate authorship, intellectual ownership, and acceptable delegation of cognitive work.

These findings should also be considered within contextual conditions. Differences in AI literacy, instructional guidance, and prior writing ability may influence how students use AI tools. In contexts where guidelines are unclear, students may rely on AI primarily for efficiency rather than critical engagement. These findings are consistent with international research showing variation in AI use across contexts (D. Nguyen et al., 2024; Park, 2025). This study contributes additional evidence from a non-Western higher education context, highlighting similar patterns of high AI use and varying levels of ethical awareness.

Building on these findings, this study proposes an initial conceptual integration referred to as the AI–Metacognitive–Authenticity Model (AIMAM). The model synthesizes the observed relationships between AI engagement, metacognitive regulation, and ethical awareness, rather than presenting a definitive theoretical framework. The novelty of this study lies not in claiming that AI improves writing or raises concerns about authenticity—both have been reported previously—but in demonstrating that these outcomes emerge simultaneously and are shaped by internal regulatory capacities. This integrated perspective contributes to ongoing discussions on AI literacy and higher education by positioning writing performance and cognitive authenticity as interdependent rather than separate outcomes.

The implications of this study are both theoretical and practical. Theoretically, the findings extend discussions on cognitive load, self-regulated learning, and AI literacy by highlighting the importance of balancing technological support with reflective engagement. Pedagogically, the findings suggest the importance of process-oriented assessment, including activities such as reflective writing and revision tracking. Institutionally, clear guidelines on AI use are needed to support responsible and transparent academic practices and to strengthen ethical and metacognitive AI literacy among students.

Several limitations should be acknowledged. The study is context-specific and cross-sectional, limiting generalizability. Future research should use longitudinal designs to examine changes over time and explore different educational contexts. Overall, the findings indicate that the impact of AI on academic writing depends not only on the presence of AI itself but on how learners regulate, interpret, and ethically engage with its use.

CONCLUSION

This study addressed a critical issue in contemporary higher education: how artificial intelligence reshapes adult academic writing, particularly in relation to writing quality and cognitive authenticity. While AI is widely recognized for improving efficiency and performance, its broader cognitive and epistemic implications remain underexplored. The findings reveal a clear dual effect. Artificial intelligence significantly enhances text structure quality by improving coherence, organization, and linguistic accuracy. However, these gains are accompanied by a measurable decline in cognitive authenticity, reflected in reduced originality, weaker authorial voice, and diminished reflective depth. This study therefore identifies a structural–authenticity paradox, where improvements in formal writing quality coexist with risks to deeper cognitive engagement. Importantly, this relationship is not deterministic. Metacognitive self-regulation and ethical awareness emerge as critical mechanisms that enable adult learners to maintain intellectual ownership while benefiting from AI support. This study contributes to the literature by advancing the AI–Metacognitive–Authenticity Model (AIMAM), which conceptualizes writing quality as the result of dynamic interactions among technological engagement, reflective regulation, and ethical orientation. By situating AI within a broader epistemic and pedagogical framework, the study extends existing discussions beyond performance outcomes toward questions of authorship, agency, and knowledge construction in adult learning contexts. The implications are clear: the value of AI in academic writing depends not only on its technical capabilities but on how it is pedagogically integrated and ethically governed. Future research should examine longitudinal developments in metacognitive and ethical capacities, as well as cross-cultural variations in AI use. Ultimately, sustaining the integrity of academic writing in the AI era requires a balanced approach that preserves human cognition, responsibility, and authenticity.

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