

Beyond correct answers: epistemic agency and student learning in AI-assisted academic writing classrooms in Indonesia

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Article Info

Article history:

Received Apr 21, 2026

Revised May 29, 2026

Accepted Jun 30, 2026

Keywords:

academic writing;
AI literacy;
epistemic agency;
generative AI;
human-AI collaboration.

ABSTRACT

Background: The integration of generative artificial intelligence into higher education has transformed academic writing practices and raised important questions regarding students' roles as active knowledge constructors rather than passive recipients of algorithmically generated information. **Objective:** This study examines how epistemic agency is represented and negotiated within AI-assisted academic writing environments in Indonesian higher education by focusing on the interrelationship between knowledge evaluation, human-AI collaboration, and AI literacy. **Method:** This study employed a qualitative corpus-based design using publicly accessible policy documents, institutional publications, academic articles, and educational media materials related to artificial intelligence, academic writing, and student learning published between 2023 and 2026. **Results:** Findings indicate that knowledge evaluation constitutes the most prominent dimension of epistemic engagement, suggesting that verification and source validation have become central learning practices in AI-mediated writing contexts. Findings further reveal that human-AI collaboration is predominantly framed through cognitive scaffolding functions, where artificial intelligence supports idea development, argument organization, and writing processes while students retain responsibility for final intellectual decisions. **Implication:** Findings also demonstrate that although AI literacy is increasingly associated with ethical awareness and critical evaluation, reflective engagement with the epistemological implications of AI remains comparatively underdeveloped across educational discourse. **Novelty:** The novelty of this study lies in its integration of epistemic agency, human-AI collaboration, and AI literacy within a single analytical framework, thereby shifting scholarly attention from questions of writing performance and technological adoption toward broader concerns regarding knowledge construction, intellectual responsibility, and learning in AI-assisted academic writing classrooms.

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1. INTRODUCTION

Generative artificial intelligence (GenAI) has rapidly become embedded in higher education, transforming how students access information, construct arguments, and produce academic texts. The diffusion of tools such as ChatGPT, Perplexity AI, and other AI-powered writing assistants has extended beyond language correction and now influences knowledge generation itself. Recent studies indicate that

university students increasingly employ AI during writing processes for idea development, drafting, summarizing, and revision [1], [2]. In Indonesia, similar trends have been reported across English language education and academic writing classrooms, where students perceive AI as a valuable support for writing efficiency and learning performance [3], [4], [5]. At the same time, growing institutional attention to AI governance reflects concerns regarding academic integrity, critical reasoning, and student dependence on algorithmically generated knowledge. As AI systems become increasingly capable of producing academically acceptable responses, a fundamental educational question emerges: whether students are merely obtaining correct answers or actively developing the intellectual capacities required to evaluate, question, and construct knowledge independently.

Existing scholarship has substantially advanced understanding of AI-assisted academic writing, yet important conceptual gaps remain. Previous studies have predominantly examined students' perceptions of AI tools, writing performance, learning experiences, technological acceptance, and AI literacy development [6], [1], [7], [8]. Other investigations have explored interaction patterns between students and generative AI, revealing diverse forms of collaboration during writing tasks [9], [10], [11]. Research has also addressed concerns related to academic integrity, critical thinking, and responsible AI use in higher education [12], [13]. However, much of this literature evaluates AI primarily as a pedagogical tool that improves efficiency, writing quality, or learning outcomes. Comparatively less attention has been directed toward epistemic agency, namely students' capacity to exercise judgment, evaluate evidence, make intellectual decisions, and assume responsibility for knowledge construction in AI-mediated environments. Consequently, current literature provides limited insight into how AI-assisted writing may reshape students' roles as epistemic actors rather than merely technology users.

This study addresses this gap by examining epistemic agency in AI-assisted academic writing classrooms within the Indonesian higher education context. Rather than asking whether AI improves writing performance, this study investigates how students position themselves during interactions with generative AI throughout academic writing activities. Specifically, this study explores three interconnected questions: how students utilize AI during academic writing tasks; how AI-mediated writing practices influence processes of knowledge evaluation, decision-making, and argument construction; and what tensions emerge between the pursuit of correct answers and the development of independent academic reasoning. These questions are particularly relevant in multilingual and digitally mediated learning environments where students increasingly negotiate between institutional expectations, disciplinary conventions, and algorithmically generated suggestions. By shifting analytical attention from technological effectiveness to epistemic engagement, this study seeks to contribute a more nuanced understanding of learning processes in contemporary writing classrooms.

This study advances the argument that the educational implications of generative AI cannot be adequately understood through measures of writing quality or technological adoption alone. Building on discussions of epistemic authority, learner agency, critical literacy, and human–AI collaboration [14], [15], [24], [16], this study proposes that AI-assisted writing environments function as sites where students continuously negotiate responsibility for knowledge production. While AI may expand access to information and accelerate writing processes, it may also redistribute authority over interpretation, evaluation, and argumentation. Consequently, the central issue is not whether AI replaces student thinking, but how students exercise agency when algorithmic systems increasingly participate in academic knowledge work. This perspective enables a more critical examination of learning beyond performance indicators and positions epistemic agency as a key dimension for understanding educational transformation in the age of generative artificial intelligence.

2. LITERATURE REVIEW

2.1. Epistemic agency

Epistemic agency has emerged as a central concept for understanding learning in digitally mediated educational environments. Broadly defined, epistemic agency refers to learners' capacity to make informed judgments, evaluate knowledge claims, and assume responsibility for knowledge construction rather than merely receiving information from external authorities. While traditional educational perspectives often associate agency with autonomy and self-direction, recent scholarship extends this notion to contexts where human decision-making is increasingly intertwined with algorithmic systems. Jose et al. (2025) [14] argue that generative AI challenges conventional assumptions about epistemic authority by introducing machine-generated knowledge into learning processes. Similarly, Han (2025) [15] and Urban et al. (2025) [17] contend that agency in AI-supported environments involves not only producing knowledge but also critically interrogating its sources, credibility, and limitations. Consequently, epistemic agency should be understood as a dynamic process of judgment, responsibility, and intellectual participation.

Current literature identifies several dimensions through which epistemic agency can be observed in academic writing contexts. One dimension concerns evaluative judgment, referring to students' ability to

assess the reliability and relevance of information generated by AI systems. A second dimension involves decision-making authority, namely the extent to which learners retain control over argument development and textual choices. A third dimension relates to knowledge ownership, which concerns responsibility for claims incorporated into academic work. Research on epistemic beliefs and AI-assisted writing demonstrates that students vary considerably in how they verify AI-generated outputs and integrate them into their writing processes [10], [17]. These findings suggest that epistemic agency is not a fixed individual attribute but a situated practice shaped by technological affordances, educational expectations, and learners' metacognitive awareness.

2.2. Parallel to discussions

Parallel to discussions of agency, AI-assisted academic writing has become a major area of inquiry within higher education research. Existing studies generally define AI-assisted writing as the use of generative AI systems to support one or more stages of academic text production, including brainstorming, outlining, drafting, revising, and editing. However, scholars disagree on how such support should be interpreted. Some researchers view AI primarily as a productivity-enhancing tool that improves writing efficiency and linguistic accuracy [18], [19]. Others emphasize its transformative role in reshaping cognitive and communicative practices [20], [13]. Within Indonesian contexts, studies consistently report positive student perceptions regarding AI-supported writing while simultaneously highlighting concerns related to dependence, originality, and critical engagement [3], [4], [8].

Research on AI-assisted writing further identifies several recurring patterns that characterize student interaction with generative AI. First, AI functions as a linguistic assistant by improving grammar, vocabulary, and textual coherence. Second, AI serves as a cognitive scaffold that supports idea generation, organization, and argument development. Third, AI increasingly acts as a collaborative partner capable of generating substantive content and recommendations. Studies examining interaction logs and writing behaviors reveal that students employ AI in different ways depending on their literacy levels, writing goals, and disciplinary contexts [9], [1], [11]. Moreover, Chen and Jia (2026) [21] demonstrate that patterns of prompting and response evaluation significantly influence learning outcomes. These findings indicate that AI-assisted writing should be conceptualized as a spectrum of human–AI collaboration rather than a uniform technological practice.

2.3. Another influential

Another influential concept within contemporary AI-in-education scholarship is AI literacy. Although definitions vary, AI literacy generally refers to learners' ability to understand, evaluate, and responsibly use artificial intelligence technologies. Early approaches emphasized technical knowledge of AI systems, whereas more recent frameworks stress critical, ethical, and epistemic competencies. Rojo et al. (2025) [22] describe emerging generations of students as transitioning from digital natives to AI natives, requiring competencies that extend beyond operational proficiency. Similarly, Okada et al. (2025) [23] emphasize responsible participation, critical reflection, and informed decision-making as essential dimensions of AI competence. Within academic writing, AI literacy therefore encompasses not only knowing how to generate outputs but also understanding when, why, and under what conditions those outputs should be trusted or challenged.

Several interconnected indicators have been proposed to operationalize AI literacy in educational settings. These include technical competence, critical evaluation of AI-generated information, ethical awareness, transparency of AI use, and reflective regulation of learning processes. Empirical studies consistently demonstrate that students with higher levels of AI literacy tend to engage more critically with generated content rather than accepting outputs uncritically [10], [7], [5]. Nevertheless, existing research rarely examines how AI literacy intersects with epistemic agency during academic writing activities. Much of the literature treats literacy as a functional skill and agency as an implicit outcome. This study adopts a different position by conceptualizing epistemic agency, AI-assisted writing practices, and AI literacy as mutually constitutive dimensions that together shape student learning in AI-mediated academic writing classrooms.

3. METHOD

This study employed a qualitative corpus-based document analysis to examine how epistemic agency is represented, negotiated, and regulated within discussions of AI-assisted academic writing in Indonesian higher education. The unit of analysis consisted of textual and multimodal documents addressing artificial intelligence, academic writing, student learning, digital literacy, and higher education policy. The corpus was compiled from publicly accessible and verifiable sources, including government guidelines, university publications, institutional reports, policy documents, academic journal articles, and educational media

materials published between 2023 and 2026. Each document was treated as a discrete analytical unit and assigned a unique identification code. Particular attention was given to statements concerning knowledge construction, learner responsibility, AI-supported writing practices, critical evaluation, and educational governance. This approach enabled systematic examination of how educational actors conceptualize student learning beyond writing performance and technological efficiency.

This study adopted an interpretive qualitative design informed by critical literacy and epistemic perspectives on educational technology. Rather than evaluating whether AI improves writing quality, this design focused on how knowledge-related responsibilities are distributed between students and AI systems. Such an approach is particularly appropriate because recent scholarship increasingly emphasizes agency, epistemic authority, and human–AI collaboration as central educational concerns in generative AI environments [14], [15], [24]. This design allowed examination of meanings, assumptions, and discursive patterns embedded within institutional and academic discussions of AI-assisted writing. Consequently, analysis concentrated on how students are positioned as active or passive participants in knowledge production processes.

Table 1. Composition of dataset

Code	Data Type	Source	Location	Period	Number	Characteristics	Status
GOV-01 to GOV-08	Policy and guideline documents	Indonesian higher education authorities and educational agencies	Indonesia	2023–2026	8	AI governance, academic integrity, learning policies	Primary
UNI-01 to UNI-12	University publications and official reports	Public and private universities	Indonesia	2023–2026	12	AI implementation in teaching and learning	Primary
ART-01 to ART-20	Peer-reviewed journal articles	Indexed academic journals	International and Indonesia	2023–2026	20	AI-assisted writing, agency, literacy, learning	Primary
MED-01 to MED-10	Educational media and institutional websites	Educational platforms	Indonesia	2023–2026	10	Public discourse on AI in higher education	Contextual
VIS-01 to VIS-05	Visual and video materials	Institutional channels	Indonesia	2023–2026	5	Infographics, webinars, educational campaigns	Contextual

Information was derived from three interconnected categories of evidence. First, primary sources included policy documents, institutional guidelines, and academic publications discussing AI use in higher education. Second, supporting sources consisted of scholarly studies examining AI literacy, academic writing, learner agency, and educational technology. Third, contextual materials included webinars, institutional announcements, visual campaigns, and educational media reports that reflected broader public discourse surrounding generative AI. Combining these materials enabled triangulation across policy, pedagogical, and scholarly perspectives. This strategy strengthened interpretive depth by capturing multiple representations of student learning in AI-mediated environments rather than relying on a single institutional or disciplinary viewpoint.

Data collection followed a structured corpus construction protocol. Initial searches were conducted using predefined keywords, including “AI-assisted academic writing,” “generative AI,” “student learning,” “AI literacy,” “academic integrity,” “epistemic agency,” and “higher education.” Documents were screened according to predetermined inclusion and exclusion criteria. Included materials explicitly addressed educational uses of AI, academic writing, or student learning in higher education contexts. Documents unrelated to education, inaccessible records, duplicated materials, and purely promotional content were excluded. Metadata for each document were subsequently recorded, including title, date, source, document type, location, hyperlink, and contextual description. Textual excerpts and relevant visual information were then extracted and stored within a structured corpus database.

Data analysis proceeded through five stages. First, corpus familiarization was conducted through repeated reading of textual and visual materials. Second, open coding identified recurring references to knowledge evaluation, learner responsibility, AI-supported writing practices, and critical engagement. Third, codes were grouped into broader analytical categories representing epistemic agency, human–AI

collaboration, and AI literacy. Fourth, relationships among categories were examined through constant comparison and matrix coding procedures. Finally, interpretive analysis connected empirical patterns to broader theoretical debates concerning agency, epistemic authority, and learning in AI-mediated environments. This analytical sequence enabled systematic movement from descriptive observations to theoretically informed interpretations while maintaining transparency and consistency across all stages of analysis.

4. RESULTS

4.1. Patterns of epistemic agency in ai-assisted academic writing

Academic discussions surrounding generative artificial intelligence increasingly position student learning as a matter of knowledge engagement rather than merely textual production. Across the corpus, references to evaluating information, validating sources, and exercising judgment appeared more frequently than discussions focused solely on technical writing support. This pattern suggests that educational institutions, researchers, and policy actors are gradually redefining academic writing as an epistemic activity requiring active learner participation. Rather than portraying AI as a substitute for intellectual work, many documents frame AI-assisted writing as a context in which students must negotiate responsibility for knowledge construction. Such a tendency reflects broader concerns regarding authorship, accountability, and critical reasoning in contemporary higher education. Consequently, epistemic agency emerges as a recurring principle linking academic integrity, AI literacy, and student learning within evolving discussions of generative AI.

Table 2. Distribution of epistemic agency practices across the corpus

Main Dimension	Subdimension	Operational Indicator	Frequency (n=214)	Percentage (%)	Data Sources	Representative Extract	Document Codes	Interpretation
Knowledge Evaluation	Verification of AI Output	Cross-checking AI-generated information with external sources	52	24.3	Policy, Journal, University	Students are encouraged to verify AI-generated content before submission	GOV-02, ART-04, UNI-08	Active epistemic engagement
Knowledge Evaluation	Source Validation	Assessing credibility of references suggested by AI	38	17.8	Journal, Policy	AI outputs require independent source verification	ART-06, GOV-04	Shared epistemic responsibility
Decision-Making Authority	Argument Selection	Students decide whether AI suggestions are adopted	34	15.9	Journal, University	AI recommendations remain subject to student judgment	UNI-04, ART-11	Retained human control
Decision-Making Authority	Content Modification	Revising AI-generated text before use	27	12.6	Journal, Media	Students adapt generated content to disciplinary needs	ART-09, MED-03	Human mediation of AI output
Knowledge Ownership	Authorial Responsibility	Accountability for final academic claims	23	10.7	Policy, Journal	Responsibility remains with the student author	GOV-05, ART-07	Human authorship emphasized
Knowledge Ownership	Ethical Disclosure	Explicit acknowledgement of AI assistance	18	8.4	Policy, University	AI use should be transparently reported	GOV-07, UNI-10	Integrity-oriented practice
Critical Reflection	Awareness of AI Limitations	Recognition of hallucination and factual errors	13	6.1	Journal, Policy	AI-generated information may contain inaccuracies	ART-13, GOV-08	Epistemic caution
Critical Reflection	Reflexive Learning	Reflection on learning beyond AI-generated answers	9	4.2	Journal, University	Students should evaluate reasoning processes	UNI-06, ART-15	Emerging reflective agency

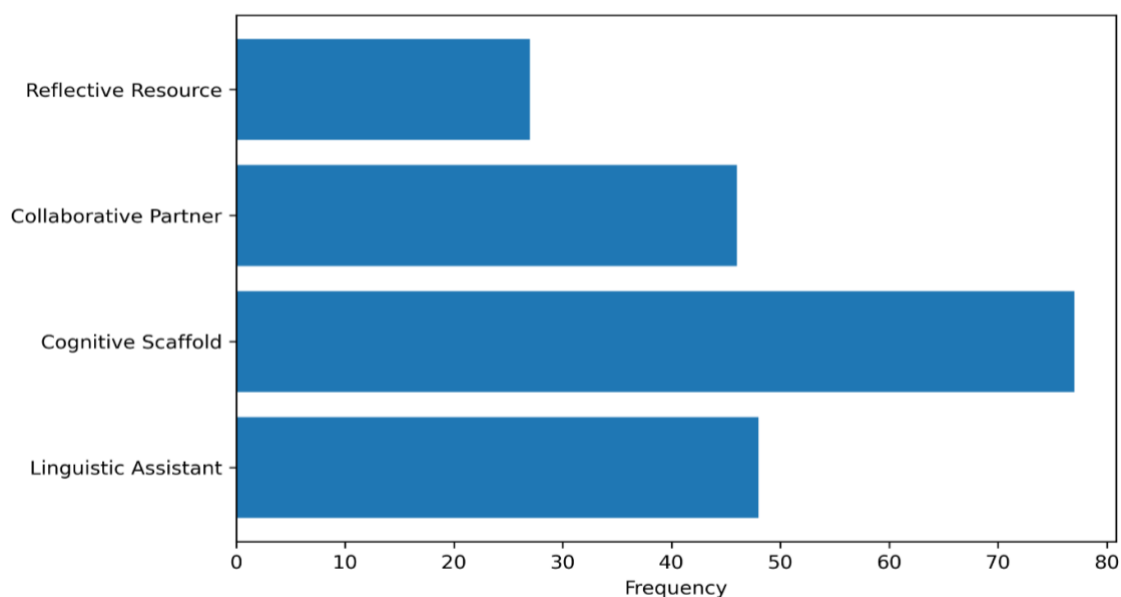


Figure 1. Distribution of epistemic agency dimensions

Several dominant patterns can be identified from the distribution of coded categories. References related to knowledge evaluation account for nearly one quarter of all coded segments, making this dimension the most prominent feature within the corpus. Documents repeatedly emphasize verification practices, source checking, and independent assessment of AI-generated information. Decision-making authority represents the second largest category, indicating sustained attention to students' control over argument development and textual choices. By contrast, critical reflection appears less frequently, suggesting that discussions of metacognitive engagement remain comparatively underdeveloped. Ethical disclosure and authorial responsibility occupy an intermediate position, often appearing in institutional guidelines and policy documents. Overall, corpus evidence demonstrates that current educational discourse places stronger emphasis on evaluating AI outputs than on fostering deeper reflection about how knowledge itself is produced and justified.

These patterns align with emerging theoretical debates concerning epistemic authority in AI-mediated learning environments. Jose et al. (2025) [14] argue that generative AI redistributes authority over knowledge production, requiring learners to actively negotiate what should be accepted, revised, or rejected. Similar concerns are reflected in studies by Han (2025) [15] and Urban et al. (2025) [17], which emphasize the importance of judgment and verification when students interact with algorithmically generated content. The prominence of knowledge evaluation within the corpus suggests that educational actors increasingly recognize AI as a source of epistemic uncertainty rather than unquestioned expertise. At the same time, the comparatively limited presence of critical reflection indicates that institutional responses remain concentrated on procedural verification rather than deeper examination of learning processes. From this perspective, epistemic agency appears not as individual autonomy alone but as an ongoing practice of negotiating authority, responsibility, and credibility within human–AI knowledge ecosystems.

4.2. Human–AI Collaboration Patterns in Academic Writing Practices

Interaction between students and generative AI is rarely represented as a simple input–output relationship. Across the corpus, AI is predominantly portrayed as a support mechanism that extends learners' writing capabilities through idea generation, organizational assistance, and language refinement. Educational institutions and scholarly publications frequently describe AI as a resource that can facilitate different stages of academic writing rather than merely producing finished texts. This tendency indicates an emerging shift from tool-oriented perspectives toward collaboration-oriented understandings of AI use. Within such discussions, writing is conceptualized as an iterative process involving continuous negotiation between human judgment and algorithmic suggestions. Consequently, collaboration becomes a central mechanism through which students engage with AI during academic knowledge production.

Table 3. Human–AI collaboration configurations across the corpus

Main Dimension	Collaboration Type	Operational Indicator	Frequency (n=198)	Percentage (%)	Data Sources	Representative Extract	Document Codes	Interpretation
AI as Linguistic Assistant	Language Correction	Grammar, vocabulary, and sentence refinement	48	24.2	Journal, University	AI assists in improving language accuracy and readability	UNI-03, ART-05, ART-12	Surface-level writing support
AI as Cognitive Scaffold	Idea Development	Topic exploration and brainstorming support	42	21.2	Journal, University	AI facilitates generation of initial ideas and perspectives	ART-03, UNI-05	Expansion of cognitive resources
AI as Cognitive Scaffold	Structural Organization	Organizing arguments and academic structure	35	17.7	Journal, Media	AI provides outlines and logical sequencing	ART-08, MED-04	Guided composition process
AI as Collaborative Partner	Content Generation	Production of paragraphs, summaries, and drafts	28	14.1	Journal, Policy	AI generates substantial textual content	ART-14, GOV-03	Increased algorithmic participation
AI as Collaborative Partner	Iterative Dialogue	Repeated prompting and response refinement	18	9.1	Journal, University	Writing develops through multiple interactions	UNI-07, ART-18	Co-constructive writing process
AI as Reflective Resource	Alternative Perspectives	Exposure to different viewpoints and interpretations	14	7.1	Journal, University	AI offers alternative framing of arguments	ART-17, UNI-09	Perspective diversification
AI as Reflective Resource	Counterargument Support	Identifying weaknesses and opposing views	13	6.6	Journal, University	AI assists in evaluating argument strength	ART-16, UNI-11	Enhanced argumentative awareness

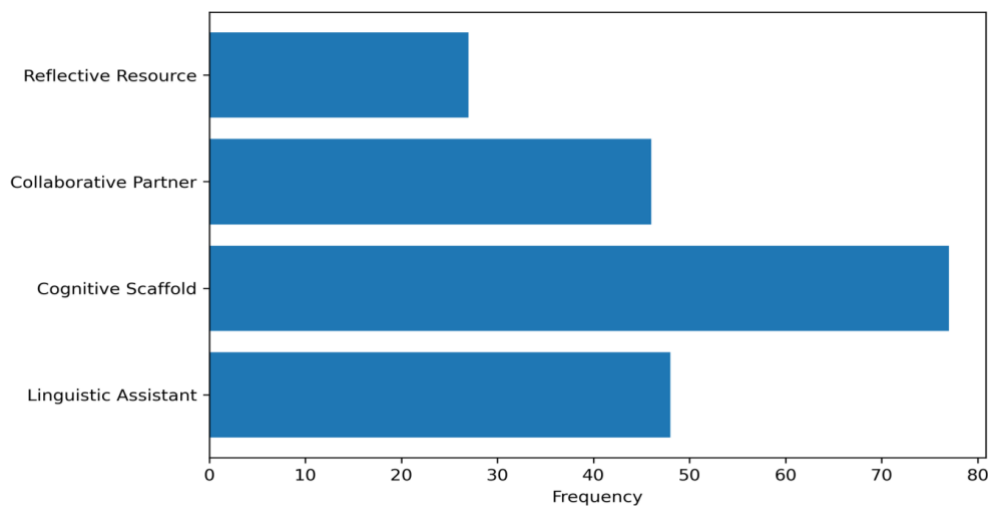


Figure 2. Distribution of human–AI collaboration configurations

Several notable patterns emerge from the distribution of collaboration types. Cognitive scaffolding constitutes the largest category, accounting for more than one-third of all coded segments when idea development and structural organization are combined. References to brainstorming, outlining, and argument planning appear more frequently than direct content generation. Linguistic assistance also occupies a substantial proportion of the corpus, particularly in discussions of grammar correction and textual clarity. Meanwhile, collaborative-partner functions are present but less dominant, suggesting that educational discourse remains cautious regarding extensive delegation of writing tasks to AI systems. Reflective-resource functions represent the smallest category, although they appear consistently across university and journal sources. Overall, corpus evidence suggests that AI is most commonly framed as an intellectual support system rather than an autonomous author.

These findings resonate with contemporary scholarship on human–AI collaboration in educational contexts. Nguyen et al. (2024) [9] argue that academic writing increasingly involves distributed forms of cognition in which learners and AI systems contribute different forms of expertise. Similar observations are reported by Kim et al. (2025) [10] and Yang et al. (2025) [11], who demonstrate that writing outcomes are shaped by interaction patterns rather than technological use alone. The predominance of cognitive-scaffolding functions suggests that AI currently operates as an extension of students’ planning and reasoning processes rather than a replacement for them. At the same time, the growing presence of content-generation functions reflects a gradual redistribution of authorship responsibilities within academic writing practices. Viewed through a human–AI collaboration perspective, learning is not located exclusively within students or technologies but emerges through ongoing interaction between both actors.

4.3. AI Literacy and Critical Regulation of Knowledge

These patterns reinforce recent theoretical developments that conceptualize AI literacy as an epistemic rather than merely technological capability. Kim et al. (2025) [10] argue that students’ interaction quality depends substantially on their level of AI literacy, particularly their ability to formulate effective prompts and critically evaluate generated responses. Comparable arguments are presented by Rojo et al. (2025) [22] and Okada et al. (2025) [23], who position AI literacy within broader frameworks of media literacy, ethical reasoning, and lifelong learning competencies. Corpus evidence is also consistent with Amani and Bisriyah (2025) [7], who emphasize self-regulated learning as a key characteristic of responsible AI-assisted writing. At the same time, the relatively lower frequency of reflective regulation indicates that institutional discourse continues to prioritize procedural guidance over deeper epistemological reflection. Taken together, these findings suggest that AI literacy functions as the mechanism through which epistemic agency and human–AI collaboration are translated into responsible academic practice, thereby integrating technological competence with intellectual accountability in AI-assisted writing classrooms.

Table 4. AI literacy and critical regulation of knowledge across the corpus

Main Dimension	Subdimension	Operational Indicator	Frequency (n=186)	Percentage (%)	Data Sources	Representative Extract	Document Codes	Interpretation
Critical Evaluation	Verification of AI-generated Information	Comparing AI outputs with scholarly or authoritative sources	47	25.3	Journal, Policy, University	Students are encouraged to verify AI-generated information before academic use	GOV-02, ART-06, UNI-09	Verification constitutes the primary expression of AI literacy
Ethical AI Use	Transparency and Disclosure	Explicit acknowledgment of AI assistance in academic writing	35	18.8	Policy, University	AI-assisted writing should be transparently reported	GOV-05, UNI-10	Ethical literacy emphasized institutionally
Prompt Literacy	Strategic Prompt Development	Refining prompts to improve relevance and accuracy	31	16.7	Journal, University	Prompt refinement improves interaction quality	ART-11, UNI-06	Prompting viewed as an emerging academic competency
Information Judgment	Recognition of Hallucination	Identifying fabricated references or unsupported claims	28	15.1	Journal, Policy	AI may generate inaccurate or non-existent sources	ART-08, GOV-07	Critical awareness of algorithmic limitations
Self-Regulated Learning	Reflective Revision	Revising AI-generated text through independent reasoning	24	12.9	Journal, University	Students critically revise AI outputs before submission	ART-14, UNI-12	Human regulation remains central
Responsible Decision-Making	Selection of AI Suggestions	Accepting or rejecting AI recommendations based on disciplinary appropriateness	21	11.3	Journal, University	Final decisions remain with student authors	ART-15, UNI-11	Intellectual autonomy retained

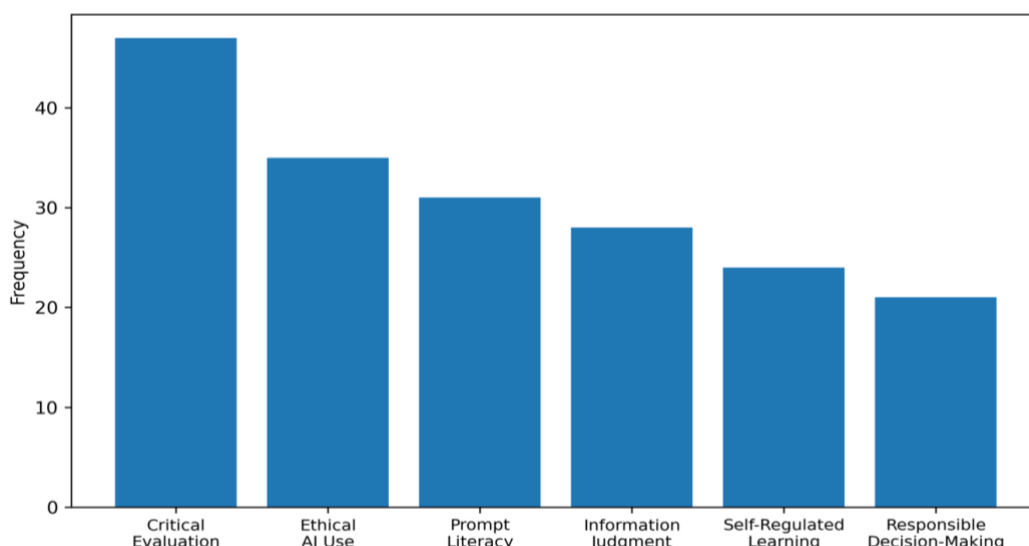


Figure 3. Distribution of AI literacy dimensions

The corpus demonstrates that discussions of AI literacy increasingly extend beyond operational competence toward critical regulation of knowledge. Rather than defining AI literacy solely as the ability to operate generative technologies, institutional documents, policy statements, and scholarly publications consistently associate literacy with evaluating information quality, recognizing algorithmic limitations, and exercising ethical responsibility throughout academic writing. This pattern complements the previous findings on epistemic agency and human–AI collaboration by suggesting that effective engagement with AI depends on students’ capacity to regulate knowledge rather than merely access technological assistance. Consequently, AI literacy emerges as a multidimensional construct combining technical competence, critical judgment, ethical awareness, and reflective decision-making. Such an orientation indicates that responsible AI use is becoming an integral component of academic writing discourse rather than an isolated digital skill.

Several dominant tendencies are evident across the coded corpus. Critical evaluation represents the largest category, indicating that verification of AI-generated information constitutes the most visible literacy practice. Ethical AI use and prompt literacy follow closely, reflecting increasing institutional attention to transparency and effective interaction with generative systems. References to hallucination recognition also appear frequently, demonstrating widespread awareness that algorithmic fluency does not necessarily correspond to factual reliability. Meanwhile, self-regulated revision and responsible decision-making occur less frequently but remain consistently distributed across journal articles and university guidelines. Collectively, these patterns suggest that educational discourse conceptualizes AI literacy as a continuum of evaluative, ethical, and metacognitive practices. Technical proficiency alone is therefore insufficient; meaningful literacy requires sustained human oversight throughout the academic writing process.

5. DISCUSSION

The prominence of knowledge evaluation within the corpus carries important implications for understanding student learning in AI-assisted academic writing environments. Rather than positioning learning as the accumulation of correct answers, corpus evidence suggests a growing emphasis on evaluating, verifying, and contextualizing information generated by AI systems. This shift is significant because academic writing has traditionally been associated with the development of disciplinary reasoning rather than the reproduction of information. From this perspective, verification practices function as mechanisms through which students maintain intellectual responsibility in increasingly automated learning environments. This interpretation aligns with Urban et al. (2025) [17], who argue that epistemic beliefs shape how learners integrate AI-generated content into academic work. At the same time, this finding extends previous studies that primarily examined writing performance or technological acceptance [1], [3]. What emerges is a broader educational concern: the quality of learning depends not only on accessing information efficiently but also on sustaining learners’ capacity to judge what constitutes credible knowledge. Consequently, epistemic agency becomes a fundamental educational outcome rather than a secondary consequence of AI use.

The predominance of evaluative practices can be explained by structural tensions introduced by generative AI into contemporary knowledge ecosystems. AI systems produce fluent and persuasive responses that often resemble authoritative academic discourse, yet they do not inherently guarantee factual accuracy, contextual relevance, or disciplinary validity. Such conditions create epistemic uncertainty that requires

active human judgment. Jose et al. (2025) [14] describe this phenomenon as a redistribution of epistemic authority, whereby learners must negotiate between machine-generated suggestions and established knowledge sources. Similarly, Yeo (2023) [12] argues that academic integrity concerns increasingly arise from questions of verification rather than simple authorship. While some studies suggest that students may become overly dependent on AI-generated information [13], corpus evidence indicates that institutional and scholarly discourses continue to emphasize human responsibility for evaluating knowledge claims. This pattern suggests that the rise of generative AI has not diminished the importance of critical judgment; instead, it has elevated its significance. Knowledge evaluation therefore emerges as a structural response to the growing complexity of information production in higher education.

The prominence of cognitive scaffolding and collaborative support also has broader implications for how learning is conceptualized in AI-mediated writing environments. Corpus evidence indicates that AI is most frequently framed as a resource for brainstorming, organizing arguments, and supporting composition rather than as an autonomous producer of academic texts. This finding suggests that educational actors increasingly perceive learning as a collaborative process in which technology can extend cognitive capabilities without necessarily replacing human intellectual engagement. Such a perspective challenges deterministic narratives portraying AI either as a threat to learning or as a universally beneficial educational solution. Instead, AI appears to function as a mediating tool that expands students' access to ideas, alternative perspectives, and organizational strategies. These observations resonate with Nguyen et al. (2024) [9] and Kim et al. (2025) [10], who emphasize interaction patterns rather than technological presence alone. Accordingly, the educational significance of AI lies less in content generation itself and more in how learners integrate technological support into broader processes of reasoning, reflection, and argument development.

Several underlying factors help explain why cognitive scaffolding occupies a more prominent position than extensive content generation. First, academic institutions continue to prioritize authorship, originality, and disciplinary reasoning, creating normative expectations that discourage complete reliance on AI-generated text. Second, students frequently use AI to reduce cognitive barriers associated with planning, idea generation, and structural organization while retaining control over final arguments. This interpretation is consistent with findings reported by Song and Song (2023) [18], Apriani et al. (2025) [19], and Andriyanti et al. (2025) [4], who observe that learners often perceive AI as a supportive rather than substitutive resource. However, this finding partially contrasts with concerns raised by Deep and Chen (2025) [13], who suggest that extensive automation may weaken critical engagement. Corpus evidence indicates that such outcomes are not inevitable. Instead, the educational consequences of AI appear to depend on how technologies are pedagogically positioned. Human-AI collaboration therefore reflects institutional norms, learner expectations, and disciplinary cultures as much as technological capabilities.

Another important implication concerns the relatively limited visibility of critical reflection and advanced AI literacy within educational discourse. Although references to ethical disclosure, awareness of AI limitations, and reflective learning are present, they appear less frequently than categories associated with verification or cognitive support. This imbalance suggests that discussions about responsible AI use remain concentrated on procedural compliance rather than deeper epistemic reflection [25]. From an educational perspective, such a pattern may constrain students' ability to critically examine how knowledge is produced, validated, and circulated through algorithmic systems. Recent scholarship increasingly argues that AI literacy extends beyond technical competence and includes ethical reasoning, transparency, and critical evaluation [22], [23]. Corpus evidence supports this position by indicating that effective engagement with AI requires more than operational skills. As AI becomes increasingly integrated into academic writing practices, educational institutions may need to prioritize reflective and critical dimensions of literacy to ensure that technological proficiency is accompanied by epistemic responsibility.

The limited prominence of reflective literacy can be linked to broader structural characteristics of contemporary higher education. Educational responses to generative AI have often focused on immediate concerns such as plagiarism detection, disclosure requirements, and acceptable use policies. While such measures are necessary, they may inadvertently frame AI primarily as a governance issue rather than a transformative epistemic phenomenon. Wulandari (2026) [16] argues that critical literacy in digital environments requires learners to interrogate power relations embedded within information systems, while Han (2025) [15] similarly emphasizes the need to reconcile technological efficiency with human agency. Corpus evidence suggests that this transition remains incomplete. Discussions of AI frequently address how students should use technological tools but less frequently explore how those tools reshape assumptions about knowledge, expertise, and learning. This observation helps explain why epistemic agency occupies a central position within this study. Rather than treating AI literacy, academic integrity, and human-AI collaboration as separate concerns, this study suggests that they converge around a common question: how students maintain meaningful participation in knowledge construction within increasingly algorithmic educational environments.

6. CONCLUSION

This study demonstrates that discussions of AI-assisted academic writing in Indonesian higher education extend beyond concerns about writing accuracy and technological efficiency toward broader questions of epistemic agency. Corpus evidence indicates that knowledge evaluation, human–AI collaboration, and AI literacy constitute interconnected dimensions through which students negotiate responsibility for knowledge construction in AI-mediated learning environments. A key lesson emerging from this analysis is that meaningful learning is not determined by access to correct answers alone, but by learners' capacity to assess, interpret, and justify knowledge claims generated through interactions with AI systems. This contribution advances existing scholarship by repositioning academic writing as an epistemic practice rather than merely a linguistic or technological activity. Methodologically, this study offers a corpus-based framework that integrates epistemic agency, collaboration patterns, and AI literacy within a single analytical model, thereby providing a more comprehensive perspective on student learning in the age of generative artificial intelligence.

Several limitations should nevertheless be acknowledged. Because this study relies on publicly available documents, institutional texts, and scholarly publications, findings reflect dominant discursive constructions rather than direct observations of student behavior or classroom interactions. Consequently, interpretations should not be understood as representations of all student experiences across Indonesian higher education contexts. Future research would benefit from incorporating interviews, classroom observations, writing-process data, prompt logs, and longitudinal learning records to examine how epistemic agency is enacted in everyday academic practice. Comparative studies across disciplines, institutions, and levels of AI literacy may further illuminate variations in human–AI knowledge construction. Future investigations could also explore how pedagogical interventions, assessment designs, and AI governance frameworks influence students' ability to maintain intellectual autonomy while engaging productively with increasingly sophisticated generative AI technologies.

ACKNOWLEDGMENTS

The author thanks the reviewers and editorial team for their constructive feedback on this manuscript.

FUNDING INFORMATION

Author states no funding involved.

AUTHOR CONTRIBUTIONS STATEMENT

Ridhatullah Assya'bani: conceptualization, methodology, formal analysis, writing – original draft, writing – review and editing.

CONFLICT OF INTEREST STATEMENT

Author states no conflict of interest.

AI USE DECLARATION

The author used artificial intelligence tools to assist with the generation of illustrative figures and with the formatting and layout of this manuscript. AI was not used to generate the substantive content, conceptualization, data, analysis, or conclusions of the research, all of which remain the sole responsibility of the author.

INFORMED CONSENT

Not applicable – this study did not involve direct human participants. Data consisted solely of publicly accessible policy documents, institutional publications, and academic articles.

ETHICAL APPROVAL

This research did not involve human or animal subjects; it analyzed publicly accessible policy documents, institutional publications, and academic articles, and therefore no institutional review board approval was required. Where research does involve human subjects, the author affirms that such research would be conducted in full compliance with all relevant national regulations and institutional policies, in accordance with the tenets of the Declaration of Helsinki, and would be approved by the author's institutional review board or equivalent committee.

DATA AVAILABILITY

The corpus of documents analyzed in this study are publicly accessible and available from the corresponding author upon reasonable request.

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