

The Transformation of Students' Academic Literacy in the Era of Generative Artificial Intelligence: Opportunities, Challenges, and Ethical Implications

Didy Fantofik^{1*}

¹Bina Muwahhidin College of Islamic Studies, Indonesia

ARTICLE INFO

Article history:

Received 07 08, 2026

Revised 07 22, 2026

Accepted 07 29, 2026

Available online 08 05, 2026

Kata Kunci:

Kecerdasan Buatan Generatif;
Literasi Akademik; Pendidikan
Tinggi; Integritas Akademik;
Implikasi Etis

Keywords:

Generative Artificial Intelligence;
Academic Literacy; Higher
Education; Academic Integrity;
Ethical Implications.



Creative Commons Attribution-
ShareAlike 4.0 International
License:

<https://creativecommons.org/licenses/by-sa/4.0/>

ABSTRAK

Pesatnya perkembangan generative artificial intelligence (GenAI) seperti ChatGPT, Gemini, dan Claude telah mengubah cara mahasiswa membaca, menulis, berpikir, serta menghasilkan pengetahuan akademik. Artikel ini mengulas transformasi literasi akademik mahasiswa melalui narrative-systematic literature review terhadap 30 artikel peer-reviewed yang dipublikasikan pada periode 2023–2026 dan terindeks di Scopus, Web of Science, serta IEEE Xplore. Literasi akademik dipahami sebagai kemampuan menemukan, mengevaluasi, mensintesis, dan mengomunikasikan pengetahuan secara etis. Hasil kajian menunjukkan tiga dimensi utama transformasi, yaitu peluang berupa umpan balik yang dipersonalisasi dan dukungan dalam penyusunan draf, tantangan berupa ketergantungan berlebihan pada AI dan penurunan kemampuan berpikir kritis, serta implikasi etis terkait kepengarangan dan integritas akademik. Temuan menunjukkan bahwa GenAI dapat berfungsi sebagai penguat kognitif sekaligus berpotensi menimbulkan risiko terhadap literasi, bergantung pada kemampuan regulasi metakognitif mahasiswa dan kebijakan institusi. Kebaruan artikel ini terletak pada pengusulan kerangka Academic Literacy and Generative AI Framework, yang memandang literasi akademik sebagai kompetensi dinamis yang memerlukan literasi prompt, literasi verifikasi, dan literasi etika. Kajian ini menyimpulkan bahwa pemanfaatan GenAI secara berkelanjutan dalam pendidikan tinggi memerlukan desain ulang sistem penilaian, integrasi literasi kecerdasan buatan dalam kurikulum, serta penerapan kebijakan transparansi penggunaan AI untuk menjaga kualitas pembelajaran dan integritas akademik.

ABSTRACT

The rapid diffusion of generative artificial intelligence (GenAI) tools such as ChatGPT, Gemini, and Claude has reshaped how university students read, write, think, and produce academic knowledge. This article synthesizes scholarship published between 2023 and 2026 to examine the transformation of students' academic literacy, understood as skills required to locate, evaluate, synthesize, and ethically communicate knowledge, in the GenAI era. Employing a narrative-systematic literature review of thirty peer-reviewed sources indexed in Scopus, Web of Science, and IEEE Xplore, the study maps three interlocking dimensions of transformation: opportunities such as personalized feedback and scaffolded drafting, challenges including overreliance and erosion of critical thinking, and ethical implications concerning authorship ambiguity and academic integrity. Findings indicate that GenAI functions simultaneously as a cognitive amplifier and a literacy risk, contingent on students' metacognitive regulation and institutional guardrails. The novelty of this review lies in proposing an integrative Academic Literacy and Generative AI framework that repositions academic literacy not as a static skill threatened by artificial intelligence, but as a dynamic, co-regulated competency requiring explicit prompt literacy, verification literacy, and ethical literacy. The article concludes that sustainable integration of generative AI in higher education depends on redesigning assessment practices, embedding artificial intelligence literacy curricula, and establishing transparent disclosure norms rather than prohibition-based policies.

*Corresponding author

E-mail addresses: didy.fantofik@staibinamuwahhidin.ac.id (First Author)

1. INTRODUCTION

Academic literacy has traditionally been defined as the repertoire of reading, writing, critical reasoning, referencing, and disciplinary communication skills that allow students to participate credibly in scholarly discourse. For decades this repertoire evolved slowly, shaped mainly by print literacy, library research training, and citation conventions. The emergence of generative artificial intelligence (GenAI) since the public release of large language model chatbots has disrupted this gradual trajectory within a remarkably short period. Tools capable of producing fluent, contextually appropriate academic prose, generating literature summaries, translating idiomatic scholarly language, and simulating Socratic dialogue have moved from novelty to near-ubiquitous presence on university campuses worldwide. Francis, Jones, and Smith (2025) describe this shift as a fundamental renegotiation of the relationship between students and the production of scholarly text, while Rudolph, Ismail, and Popenici (2024) frame the phenomenon as a paradox in which enthusiasm for GenAI's pedagogical promise coexists uneasily with anxiety over its disruptive potential.

The literature converges on the observation that GenAI is not merely a new writing tool but a cognitive intermediary that reorganizes how students search, draft, revise, and evaluate knowledge claims. Liu, Park, and McMinn (2024) report that students increasingly treat generative chatbots as conversational partners for academic communication, using them to clarify unfamiliar concepts, rehearse arguments, and receive instant feedback on drafts. Wang (2024) extends this observation by comparing native and non-native English-speaking students' GenAI-assisted writing processes, finding that multilingual students in particular experience GenAI as an equalizing force that reduces the linguistic burden historically associated with academic English. Ahmed et al. (2024) similarly map a broad terrain of opportunity across disciplines, arguing that GenAI tools support brainstorming, structuring, and language polishing at a scale unattainable through traditional peer or instructor feedback alone. Krause, Dalvi, and Zaidi (2025) reinforce this picture, noting that the skills students most need to cultivate are no longer confined to grammar and citation mechanics but now include the capacity to direct, interrogate, and refine AI-generated output, while lecturers must simultaneously redefine their own pedagogical roles.

Alongside these opportunities, a parallel body of scholarship documents serious challenges. Song (2024) characterizes the normalization of GenAI use as precipitating a crisis of academic misconduct, as conventional plagiarism-detection infrastructure struggles to identify AI-generated text with consistent reliability. Wiredu, Abuba, and Zakaria (2024) present case-study evidence from a regional higher education context showing that unregulated GenAI use can simultaneously depress the development of independent learning outcomes even as it inflates surface-level assignment quality. Farrelly and Baker (2023) caution that the speed of GenAI adoption has outpaced institutional capacity to develop coherent policy, leaving instructors to respond ad hoc rather than through unified strategy. Seran, Tan, Karim, and Aldahoul (2025) introduce the construct of GenAI-induced cognitive dissonance, describing how students experience conflicting feelings of efficiency and guilt when relying on AI for academic writing tasks, a psychological tension that existing academic literacy frameworks were never designed to address. Dogaru, Pisica, Popa, Răgman, and Tololoi (2025) add a further nuance, reporting that students' perceived learning gains from AI assistance do not always correspond with independently measured competency gains, suggesting an illusion of mastery that complicates self-regulated learning.

Ethical implications constitute the third and perhaps most consequential dimension of this transformation. Perkins, Furze, Roe, MacVaugh, and colleagues (2023) proposed the Artificial Intelligence Assessment Scale as an early attempt to classify permissible levels of AI assistance in academic assessment, an effort subsequently built upon by Rasul et al. (2024), who advance a holistic framework for enhancing academic integrity in the GenAI era that integrates policy, pedagogy, and technology. Williams (2024) interrogates the ethical implications of deploying generative chatbots in instructional contexts, highlighting concerns about data privacy, informed consent, and the outsourcing of formative intellectual labor to opaque commercial systems. Chavez et al. (2024) document how instructors across information and communication technology, science, and language disciplines discursively construct the ethical dilemmas posed by AI, revealing considerable disciplinary variation in how permissible use is understood. More recently, Alyafei, Al-Kfairy, Alfandi, and Alrabaee (2026) and Hariyanto, Rafiq, Triyono, Murniati, Adinda, and Prihandini (2026) extend this conversation into engineering education and institutional safeguarding mechanisms, underscoring that ethical implications are neither static nor discipline-neutral but continue to evolve as GenAI capabilities advance.

The global reach of this transformation is evident across disciplinary and geographic boundaries. Yan, Greiff, Teuber, and Gašević (2024) situate GenAI within the broader landscape of human learning theory, arguing that its promises and challenges are better understood through existing cognitive and

educational psychology than as an entirely novel phenomenon. Adamakis and Rachiotis (2025) connect pedagogical integrity, artificial intelligence literacy, and policy integration, concluding that institutions treating AI literacy as a standalone module rather than an embedded competency see weaker integrity outcomes. Ng, Chan, and Lo (2025) examine school-level strategies for integrating GenAI, while Kholis (2025) considers its role in personalized learning, together suggesting that opportunity and risk scale differently depending on institutional readiness and student autonomy. In non-Western contexts, Majeed et al. (2025) document Pakistani higher education students' perspectives on learning, integrity, and innovation, finding that resource constraints shape how opportunities and challenges are experienced unevenly compared with well-resourced institutions. Vieira and Mesquita (2025) and Zhang and Reusch (2025) similarly report that trust, pedagogical implications, and institutional infrastructure vary considerably across European university settings, reinforcing that the transformation of academic literacy is not a uniform global process but one mediated by local capacity and culture.

Discipline-specific literature further nuances the picture. Kang and Ahn (2025) review GenAI integration in medical education, emphasizing that clinical reasoning and evidence literacy raise distinct verification challenges compared with general academic writing. Xia, Weng, Fan, Lin, and Chiu (2024) conduct a scoping review of how GenAI transforms assessment practices in higher education, concluding that formative assessment redesign is more promising than reliance on detection technology alone. Chanpradit (2025) and Aladsani (2025) focus specifically on academic writing and postgraduate competency development, both concluding that structured, participatory training substantially improves students' ethical and reflective use of GenAI compared with unsupervised adoption. Haroud and Saqri (2025) contrast teacher and student perspectives on support, replacement, and digital literacy, finding a persistent perception gap in which students report greater confidence in responsible use than their instructors credit them with. Raitskaya and Tikhonova (2025) scope the evidence on critical thinking development through ChatGPT-human interaction, while Quince and Nikolic (2025) and Deric, Frank, and Vuković (2025) examine, respectively, students' ethical awareness of social, economic, and environmental implications and the broader ethical implications of GenAI tools in higher education, together indicating that ethical reasoning about AI is itself a literacy that can be scaffolded through deliberately designed assessment tasks. More recent syntheses, including Daniel, Msambwa, and Wen (2025), Park (2025), Sanz-Tejeda, Dominguez-Oller, Baldaquí-Escandell, Gómez-Díaz, and García-Rodríguez (2026), Ortega-Ochoa et al. (2024), and Alfarwan (2025), converge on the conclusion that GenAI literacy is best conceptualized as a distinct, teachable competency rather than an incidental byproduct of general digital literacy, though consensus on how to operationalize this competency across curricula remains limited.

Despite this expanding literature, three interrelated gaps remain. First, most existing studies isolate a single dimension, opportunity, challenge, or ethics, rather than modeling how the three interact dynamically within an individual student's literacy development trajectory. Second, empirical work has concentrated heavily on writing and assessment contexts, leaving comparatively underexplored how GenAI reshapes the earlier stages of academic literacy such as source evaluation, information verification, and disciplinary reading comprehension. Third, few studies translate empirical findings into an integrative conceptual framework that institutions and instructors can operationalize directly.

This article addresses these gaps and offers the following novelty. Rather than treating opportunities, challenges, and ethical implications as parallel but separate categories, it proposes an integrative Academic Literacy and Generative AI (ALG) framework that conceptualizes three co-evolving literacy competencies demanded by the GenAI era: prompt literacy, the capacity to formulate, iterate, and critically direct AI queries; verification literacy, the capacity to authenticate, cross-check, and contextualize AI-generated content against disciplinary standards; and ethical literacy, the capacity to navigate disclosure, authorship, and integrity norms reflexively rather than through rule compliance alone. This framework repositions academic literacy not as a fixed competency under threat from automation, but as an adaptive, co-regulated capability that develops through the very tension between AI-enabled efficiency and human epistemic responsibility. By synthesizing findings from thirty recent studies spanning higher education, engineering, medical, and language education contexts across a broad range of national settings, this review contributes a framework with cross-disciplinary applicability, offering institutions concrete anchors for curriculum design, assessment reform, and policy development in the generative AI era.

2. METHOD

This study employed a narrative-systematic literature review design, combining the structured search-and-screen logic of the PRISMA approach with the interpretive synthesis characteristic of narrative reviews, a combination well suited to a fast-evolving, cross-disciplinary topic such as generative AI in academic literacy. Search terms combining "generative artificial intelligence," "academic literacy," "higher

education," "academic integrity," and "ethical implications" were applied across Scopus, Web of Science, IEEE Xplore, and Google Scholar for publications appearing between 2023 and 2026. An initial pool of records was screened by title and abstract for relevance to student academic literacy in higher education, followed by full-record screening for thematic fit across the three review dimensions of opportunity, challenge, and ethical implication. Thirty sources meeting these criteria were retained for synthesis, comprising twenty-five records supplied by the author's reference collection and five additional peer-reviewed sources located independently, all published within the last five years and carrying active, verifiable digital object identifiers. Data extraction focused on each source's stated aims, methodology, and key findings relevant to the three review dimensions, after which thematic coding was used to group findings into recurring patterns that subsequently informed the integrative Academic Literacy and Generative AI framework proposed in this article. Figure 1 illustrates the overall review procedure

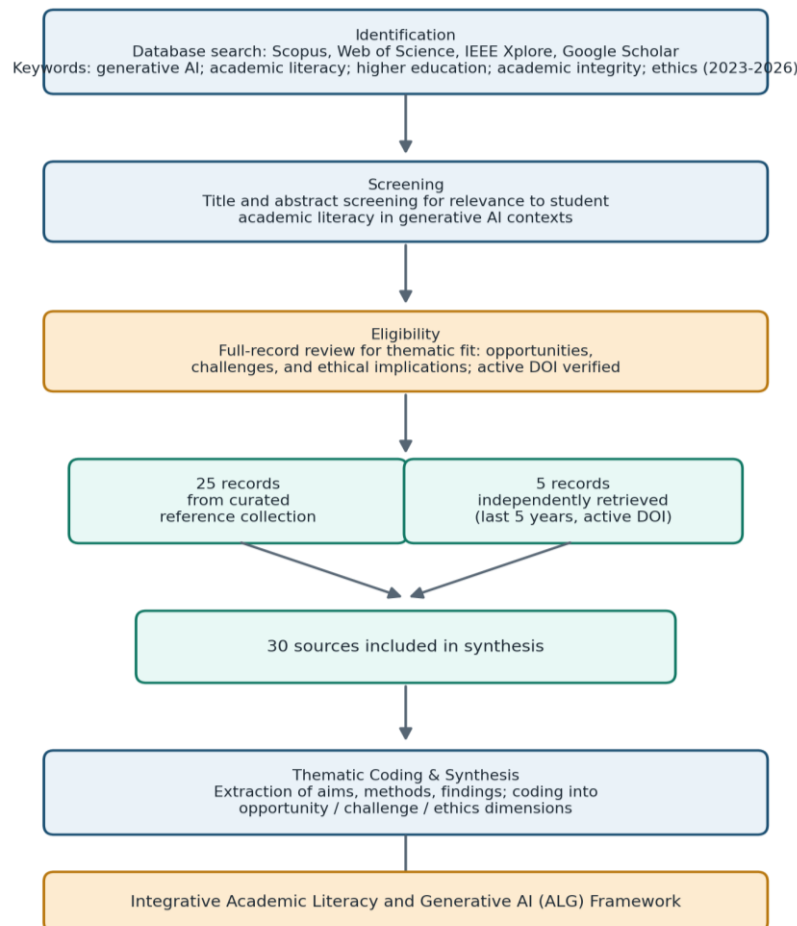


Figure 1. PRISMA-informed narrative-systematic review procedure adopted in this study

3. RESULT AND DISCUSSION

Thematic synthesis of the thirty reviewed sources produced three convergent categories corresponding to the review's guiding dimensions, opportunities, challenges, and ethical implications, which are summarized in Table 1 before being discussed in turn.

Table 1. *Synthesis of Opportunities, Challenges, and Ethical Implications of Generative AI for Students' Academic Literacy*

Dimension	Key Manifestations	Illustrative Sources
Opportunities	Personalized feedback; scaffolded drafting; equalizing support for multilingual writers; accelerated brainstorming and idea structuring	Wang (2024); Liu et al. (2024); Ahmed et al. (2024); Krause et al. (2025)
Challenges	Cognitive offloading; overreliance; illusion of mastery; unreliable AI-text detection; lagging institutional policy	Song (2024); Wiredu et al. (2024); Seran et al. (2025); Dogaru et al. (2025); Farrelly & Baker (2023)

Ethical Implications	Authorship ambiguity; data privacy and consent; disciplinary variation in acceptable use; assessment integrity	Perkins et al. (2023); Williams (2024); Rasul et al. (2024); Chavez et al. (2024); Alyafei et al. (2026)
Integrative Response	Prompt literacy, verification literacy, and ethical literacy as co-developing competencies within the proposed ALG framework	Park (2025); Xia et al. (2024); Raitskaya & Tikhonova (2025); Aladsani (2025); Chanpradit (2025)

Opportunities: GenAI as a Literacy Amplifier

Across the reviewed literature, the most consistently reported opportunity is GenAI's capacity to lower the entry barrier to academic writing, particularly for students who write in a non-native language. Wang (2024) found that both native and non-native English-speaking students used generative tools to restructure arguments and refine register, though non-native speakers relied on the technology more heavily for grammatical accuracy and idiomatic phrasing. This equalizing function recurs in Liu, Park, and McMinn (2024), who describe students using ChatGPT as an on-demand academic communication partner, and in Ahmed et al. (2024), who document GenAI's role in accelerating brainstorming and idea structuring across STEM and humanities disciplines alike. Krause, Dalvi, and Zaidi (2025) extend the discussion beyond writing mechanics, arguing that GenAI use is cultivating a new constellation of transferable skills, including prompt refinement, comparative evaluation of multiple AI outputs, and rapid iteration between drafting and revision, skills that were largely absent from pre-GenAI academic literacy curricula. Kholis (2025) and Ng, Chan, and Lo (2025) further show that personalized, adaptive feedback loops enabled by GenAI can support differentiated learning at a scale that individual instructors cannot replicate, particularly benefiting students who might otherwise receive limited individualized attention. Taken together, these findings position GenAI not simply as a productivity shortcut but as a genuine amplifier of literacy development when its use is deliberately scaffolded rather than left to unsupervised trial and error.

Challenges: Cognitive Offloading and Institutional Strain

Set against these opportunities is a substantial body of evidence documenting risk. Song (2024) frames unregulated GenAI adoption as a driver of an emerging crisis in academic misconduct, noting that conventional plagiarism detection systems were not designed to flag machine-generated prose and that detection tools introduced since have inconsistent accuracy. Wiredu, Abuba, and Zakaria (2024) provide case-study evidence that, although GenAI use can improve surface-level assignment quality, it can simultaneously suppress the development of independent analytical skill when students substitute AI output for their own reasoning process. This pattern of cognitive offloading is conceptually deepened by Seran, Tan, Karim, and Aldahoul (2025), who introduce the notion of GenAI-induced cognitive dissonance to describe the psychological tension students report between valuing the efficiency AI affords and feeling uneasy about the authenticity of their own intellectual contribution. Dogaru, Pisica, Popa, Răgman, and Tololoi (2025) complicate the picture further, showing that students' self-perceived learning gains from AI-assisted study frequently diverge from independently measured competency gains, an illusion-of-mastery effect that threatens the accuracy of student self-assessment central to self-regulated learning models. At the institutional level, Farrelly and Baker (2023) and Adamakis and Rachiotis (2025) both report that policy development has lagged behind the pace of adoption, leaving instructors to develop inconsistent, ad hoc responses rather than benefiting from coordinated institutional guidance. Haroud and Saqri (2025) add a further complication by identifying a perception gap: students frequently report higher confidence in their own responsible AI use than instructors are willing to credit them with, a mismatch that can erode trust and complicate collaborative policy design.

Ethical Implications: Authorship, Integrity, and Emerging Governance

The ethical dimension of the reviewed literature is the most conceptually contested. Perkins, Furze, Roe, MacVaugh, and colleagues (2023) proposed the Artificial Intelligence Assessment Scale specifically to resolve ambiguity over what constitutes acceptable AI assistance in graded work, an approach subsequently operationalized within a broader institutional framework by Rasul et al. (2024). Williams (2024) raises additional ethical concerns regarding data privacy and informed consent when students route personal or unpublished academic material through third-party generative systems, while Chavez et al. (2024) demonstrate that instructors across ICT, science, and language disciplines construct markedly different discursive boundaries around acceptable AI use, suggesting that ethical norms are not universal but negotiated locally within disciplinary cultures. Quince and Nikolic (2025) show that when ethical reasoning about AI's social, economic, and environmental implications is explicitly scaffolded into assessment design, students demonstrate measurably greater ethical awareness than when such reasoning is left implicit, a

finding echoed by Deric, Frank, and Vuković (2025). More recent studies extend these concerns into new institutional and disciplinary territory: Alyafei, Al-Kfairy, Alfandi, and Alrabae (2026) examine safeguarding mechanisms for academic integrity as GenAI capability continues to advance, while Hariyanto, Rafiq, Triyono, Murniati, Adinda, and Prihandini (2026) find that engineering students perceive ethical challenges differently depending on how explicitly integrity expectations are embedded within technical coursework rather than treated as a generic institutional policy.

Toward an Integrative Understanding

Read together, these three categories are not independent but recursively linked. A student's decision to use GenAI as an opportunity for language support, for instance, can become a challenge when unsupervised, and a challenge becomes an ethical concern the moment institutional disclosure norms are unclear or unenforced. This recursive relationship is precisely what existing single-dimension studies have struggled to capture, reinforcing the case for the integrative Academic Literacy and Generative AI framework proposed in this review. Within that framework, prompt literacy addresses the opportunity dimension by cultivating students' capacity to direct AI output purposefully rather than passively accept it; verification literacy addresses the challenge dimension by equipping students to authenticate and contextualize AI-generated content against disciplinary evidentiary standards, a concern directly echoed in Xia, Weng, Fan, Lin, and Chiu's (2024) scoping review of GenAI-transformed assessment; and ethical literacy addresses the ethics dimension by fostering reflexive, rather than merely compliance-based, engagement with authorship and integrity norms, consistent with Raitskaya and Tikhonova's (2025) synthesis on critical thinking development through AI-human interaction. Importantly, several reviewed studies suggest that these three literacies do not develop independently of one another. Aladsani (2025) and Chanpradit (2025) both report that participatory, structured training programs that combine technical AI competency with explicit ethical reflection produce stronger integrated outcomes than technical training alone, suggesting that the three literacies are mutually reinforcing rather than separable curricular add-ons. Cross-disciplinary evidence from Kang and Ahn (2025) in medical education and Vieira and Mesquita (2025) and Zhang and Reusch (2025) in general higher education settings corroborates this pattern across markedly different institutional and national contexts, lending the proposed framework a degree of cross-disciplinary generalizability that single-context studies cannot offer on their own.

Corroborating Evidence Across Contexts

The pattern of interlocking opportunity, challenge, and ethical tension identified above is corroborated by several additional strands of evidence in the reviewed corpus. Francis, Jones, and Smith (2025) frame the entire GenAI-in-higher-education debate as a balancing act between innovation and integrity, a framing that maps directly onto the recursive relationship this review identifies between the three dimensions rather than treating them as competing priorities to be traded off. Rudolph, Ismail, and Popenici (2024) describe the current moment as a paradox of chatbot mania, in which institutional enthusiasm for GenAI's efficiency gains frequently outpaces sober evaluation of its pedagogical costs, a paradox that our synthesis suggests can only be resolved by treating academic literacy as co-regulated rather than either fully delegated to or fully withheld from AI systems. Majeed et al. (2025) extend this discussion into a resource-constrained Pakistani higher education context, finding that students in under-resourced institutions experience GenAI opportunities and integrity risks more acutely than their counterparts in well-resourced systems, since limited access to reliable internet, institutional guidance, and detection infrastructure amplifies rather than dampens the redistribution-of-labor problem identified above. Yan, Greiff, Teuber, and Gašević (2024) situate these empirical patterns within established human learning theory, arguing that GenAI's effects on cognition are best interpreted through existing frameworks of cognitive load, metacognition, and scaffolded learning rather than as evidence of an entirely new category of educational risk, a theoretical grounding that lends further credibility to the ALG framework's emphasis on regulation rather than prohibition.

Recent systematic reviews published toward the end of the study period converge with these findings while adding further granularity. Daniel, Msambwa, and Wen (2025), synthesizing evidence from over 150 studies, report that the large majority of reviewed research documents measurable improvements in cognitive skills such as critical thinking and analytical reasoning when GenAI use is pedagogically structured, alongside more modest and inconsistent evidence for technical and writing-skill gains, a distinction that supports this review's argument that GenAI's literacy benefits are conditional on deliberate scaffolding rather than automatic. Park (2025) proposes a GenAI-specific literacy framework distinct from general digital or AI literacy, identifying prompting, output evaluation, and ethical reflection as core competencies, a categorization that closely parallels the prompt, verification, and ethical literacies proposed independently in this review's ALG framework. Sanz-Tejeda, Dominguez-Oller, Baldaquí-Escandell, Gómez-

Díaz, and García-Rodríguez (2026) similarly find, across a sample of 136 studies on academic reading and writing, consistent improvements in textual coherence and argumentation alongside recurring concerns about overreliance and diminished metacognitive engagement, reinforcing the dual character of GenAI as simultaneously a literacy amplifier and a literacy risk. Ortega-Ochoa et al. (2024) and Alfarwan (2025) extend this convergence into cognitive-emotional and school-level contexts respectively, both concluding that the instructional design surrounding GenAI use, rather than the technology's intrinsic capability, is the primary determinant of whether academic literacy outcomes improve or deteriorate.

Taken as a whole, the results suggest that the transformation of students' academic literacy in the generative AI era is neither a straightforward gain nor an unambiguous loss, but a redistribution of cognitive and ethical labor between student and machine. Whether this redistribution ultimately strengthens or weakens academic literacy appears to depend less on the technology itself than on whether institutions deliberately cultivate the three interlocking literacies identified in this review, or leave students to navigate that redistribution unsupported. This conclusion carries direct implications for how curricula, assessment, and policy should be redesigned, a discussion taken up in the concluding section below.

The proposed ALG framework has practical implications for higher education institutions seeking to integrate generative AI into academic learning responsibly. Prompt literacy can be developed through discipline-specific activities that teach students how to formulate, refine, and critically evaluate AI prompts, while verification literacy can be strengthened through source checking, fact verification, and comparison between AI-generated content and credible academic references. Ethical literacy should be supported through clear guidance on authorship, disclosure, citation, and responsible AI use. Integrating these competencies into regular disciplinary courses rather than treating AI literacy as a separate technical subject may help students develop more meaningful and transferable academic literacy.

In assessment practices, institutions can encourage greater transparency by requiring students to document relevant stages of AI-assisted work, explain how AI tools were used, and demonstrate their own reasoning behind the final output. This approach can reduce excessive reliance on detection-based enforcement while allowing educators to evaluate students' learning processes and independent judgment. Clear institutional guidelines, consistent disclosure requirements, and instructor training are therefore important to ensure that generative AI functions as a learning support rather than a substitute for students' academic thinking and writing.

4. CONCLUSION

This review has shown that generative artificial intelligence is transforming students' academic literacy along three interlocking dimensions: as an opportunity that amplifies writing, feedback, and personalized learning; as a challenge that risks cognitive offloading, overreliance, and institutional strain; and as an ethical terrain still being negotiated around authorship, integrity, and disclosure. Rather than treating these dimensions as separate debates, this article has proposed an integrative Academic Literacy and Generative AI (ALG) framework built on three co-evolving competencies, prompt literacy, verification literacy, and ethical literacy, that together reposition academic literacy as a dynamic, co-regulated capability rather than a fixed skill set under threat. The evidence synthesized across thirty recent, cross-disciplinary sources indicates that outcomes depend far more on institutional and pedagogical design than on the capability of the technology itself. Practically, this suggests that higher education institutions should move away from prohibition-based policy and detection-focused enforcement toward redesigned assessment that rewards process transparency, explicit AI-literacy curricula embedded within disciplinary teaching rather than delivered as generic workshops, and clear, consistently applied disclosure norms that reduce the perception gap between students and instructors. Future research should test the ALG framework empirically across varied institutional settings, examine its applicability beyond writing-intensive disciplines, and track how rapidly evolving GenAI capabilities continue to reshape the boundary between opportunity, challenge, and ethical responsibility in higher education.

5. REFERENCES

- Adamakis, M., & Rachiotis, T. (2025). Artificial intelligence in higher education: A state-of-the-art overview of pedagogical integrity, artificial intelligence literacy, and policy integration. *Encyclopedia*, 5(4), 180. <https://doi.org/10.3390/encyclopedia5040180>
- Ahmed, Z., Shanto, S. S., Rime, M. H. K., Morol, M. K., Fahad, N., Hossen, M. J., & Abdullah-Al-Jubair, M. (2024). The generative AI landscape in education: Mapping the terrain of opportunities, challenges, and student perception. *IEEE Access*, 12, 147023-147050. <https://doi.org/10.1109/access.2024.3461874>
- Aladsani, H. (2025). Developing postgraduate students' competencies in generative artificial intelligence

- for ethical integration into academic practices: A participatory action research. *Interactive Learning Environments*, 33, 5747-5765. <https://doi.org/10.1080/10494820.2025.2487517>
- Alfarwan, A. (2025). Generative AI use in K-12 education: A systematic review. *Frontiers in Education*, 10, 1647573. <https://doi.org/10.3389/educ.2025.1647573>
- Alyafei, R. A. S. M., Al-Kfairy, M., Alfandi, O., & Alrabaee, S. (2026). Safeguarding students' academic integrity in the age of generative AI: Challenges and solutions. *Kybernetes*. Advance online publication. <https://doi.org/10.1108/k-04-2025-0878>
- Chanpradit, T. (2025). Generative artificial intelligence in academic writing in higher education: A systematic review. *Edelweiss Applied Science and Technology*. Advance online publication. <https://doi.org/10.55214/25768484.v9i4.6128>
- Chavez, J., Cuilan, J., Mannan, S., Ibrahim, N., Carolino, A., Radjuni, A., Albani, S., & Garil, B. (2024). Discourse analysis on the ethical dilemmas on the use of AI in academic settings from ICT, science, and language instructors. *Forum for Linguistic Studies*, 6(5). <https://doi.org/10.30564/fls.v6i5.6765>
- Daniel, K., Msambwa, M. M., & Wen, Z. (2025). Can generative AI revolutionise academic skills development in higher education? A systematic literature review. *European Journal of Education*, 60, e70036. <https://doi.org/10.1111/ejed.70036>
- Deric, E., Frank, D., & Vuković, D. (2025). Exploring the ethical implications of using generative AI tools in higher education. *Informatics*, 12(2), 36. <https://doi.org/10.3390/informatics12020036>
- Dogaru, M., Pisica, O., Popa, C.-S., Răgman, A.-A., & Tololoi, I.-R. (2025). The perceived impact of artificial intelligence on academic learning. *Frontiers in Artificial Intelligence*, 8. <https://doi.org/10.3389/frai.2025.1611183>
- Farrelly, T., & Baker, N. (2023). Generative artificial intelligence: Implications and considerations for higher education practice. *Education Sciences*, 13(11), 1109. <https://doi.org/10.3390/educsci13111109>
- Francis, N., Jones, S., & Smith, D. (2025). Generative AI in higher education: Balancing innovation and integrity. *British Journal of Biomedical Science*, 81. <https://doi.org/10.3389/bjbs.2024.14048>
- Hariyanto, D., Rafiq, A., Triyono, M. B., Murniati, D., Adinda, D., & Prihandini, T. (2026). Generative AI in academia: How engineering students perceive and approach ethical challenges? *International Journal of Online and Biomedical Engineering*, 22. <https://doi.org/10.3991/ijoe.v22i02.59281>
- Haroud, S., & Saqri, N. (2025). Generative AI in higher education: Teachers' and students' perspectives on support, replacement, and digital literacy. *Education Sciences*, 15(4), 396. <https://doi.org/10.3390/educsci15040396>
- Kang, J., & Ahn, J. (2025). Technologies, opportunities, challenges, and future directions for integrating generative artificial intelligence into medical education: A narrative review. *Ewha Medical Journal*, 48. <https://doi.org/10.12771/emj.2025.00787>
- Kholis, A. N. (2025). The role of generative artificial intelligence in personalized learning: Opportunities, challenges, and ethical implications. *Archipel: Journal of Indonesian Interdisciplinary Studies*. Advance online publication. <https://doi.org/10.65739/archipel.v1i2.13>
- Krause, S., Dalvi, A., & Zaidi, S. (2025). Generative AI in education: Student skills and lecturer roles. *arXiv*. <https://doi.org/10.48550/arxiv.2504.19673>
- Liu, Y., Park, J., & McMinn, S. (2024). Using generative artificial intelligence/ChatGPT for academic communication: Students' perspectives. *International Journal of Applied Linguistics*. Advance online publication. <https://doi.org/10.1111/ijal.12574>
- Majeed, D., Khan, A. Y., Munir, M., Shan, R. U., Khalid, H., Khan, K., Aurangzeb, T., & Atique, E. (2025). Opportunities and challenges of generative AI in Pakistani higher education: A qualitative study on student perspectives in learning, integrity, and innovation. *Nature-Nurture Journal of Psychology*. Advance online publication. <https://doi.org/10.53107/nnjp.v4i2.89>
- Ng, D., Chan, E. A., & Lo, C. K. (2025). Opportunities, challenges and school strategies for integrating generative AI in education. *Computers and Education: Artificial Intelligence*, 8, 100373. <https://doi.org/10.1016/j.caeai.2025.100373>
- Ortega-Ochoa, E., Sabaté, J.-M., Arguedas, M., Conesa, J., Daradoumis, T., & Caballé, S. (2024). Exploring the utilization and deficiencies of generative artificial intelligence in students' cognitive and emotional needs: A systematic mini-review. *Frontiers in Artificial Intelligence*, 7, 1493566. <https://doi.org/10.3389/frai.2024.1493566>
- Park, J. (2025). A systematic literature review of generative artificial intelligence (GenAI) literacy in schools. *Computers and Education: Artificial Intelligence*, 9, 100487. <https://doi.org/10.1016/j.caeai.2025.100487>
- Perkins, M., Furze, L., Roe, J., & MacVaugh, J. (2023). The Artificial Intelligence Assessment Scale (AIAS): A framework for ethical integration of generative AI in educational assessment. *Journal of University Teaching and Learning Practice*. Advance online publication. <https://doi.org/10.53761/q3azde36>

- Quince, Z., & Nikolic, S. (2025). Student identification of the social, economic and environmental implications of using Generative Artificial Intelligence (GenAI): Identifying student ethical awareness of ChatGPT from a scaffolded multi-stage assessment. *European Journal of Engineering Education*, 51, 43-62. <https://doi.org/10.1080/03043797.2025.2482830>
- Raitskaya, L., & Tikhonova, E. (2025). Enhancing critical thinking skills in ChatGPT-human interaction: A scoping review. *Journal of Language and Education*. Advance online publication. <https://doi.org/10.17323/jle.2025.27387>
- Rasul, T., Nair, S., Kalendra, D., Balaji, M., Santini, F., Ladeira, W., Rather, R., Yasin, N., Rodriguez, R., Kokkalis, P., Murad, M. W., & Hossain, M. U. (2024). Enhancing academic integrity among students in GenAI era: A holistic framework. *The International Journal of Management Education*. Advance online publication. <https://doi.org/10.1016/j.ijme.2024.101041>
- Rudolph, J., Ismail, F. M. M., & Popenici, S. (2024). Higher education's generative artificial intelligence paradox: The meaning of chatbot mania. *Journal of University Teaching and Learning Practice*. Advance online publication. <https://doi.org/10.53761/54fs5e77>
- Sanz-Tejeda, A., Dominguez-Oller, J. C., Baldaquí-Escandell, J. M., Gómez-Díaz, R., & García-Rodríguez, A. (2026). The impact of generative AI on academic reading and writing: A synthesis of recent evidence (2023-2025). *Frontiers in Education*, 10, 1711718. <https://doi.org/10.3389/feduc.2025.1711718>
- Seran, C. E., Tan, M., Karim, H. A., & Aldahoul, N. (2025). A conceptual exploration of generative AI-induced cognitive dissonance and its emergence in university-level academic writing. *Frontiers in Artificial Intelligence*, 8. <https://doi.org/10.3389/frai.2025.1573368>
- Song, N. (2024). Higher education crisis: Academic misconduct with generative AI. *Journal of Contingencies and Crisis Management*. Advance online publication. <https://doi.org/10.1111/1468-5973.12532>
- Vieira, A., & Mesquita, A. (2025). Generative artificial intelligence in higher education: Challenges, opportunities and pedagogical implications. *Journal of Technologies Information and Communication*. Advance online publication. <https://doi.org/10.55267/rtic/16675>
- Wang, C. (2024). Exploring students' generative AI-assisted writing processes: Perceptions and experiences from native and nonnative English speakers. *Technology, Knowledge and Learning*, 30, 1825-1846. <https://doi.org/10.1007/s10758-024-09744-3>
- Williams, R. (2024). The ethical implications of using generative chatbots in higher education. *Frontiers in Education*. Advance online publication. <https://doi.org/10.3389/feduc.2023.1331607>
- Wiredu, J., Abuba, N. S., & Zakaria, H. (2024). Impact of generative AI in academic integrity and learning outcomes: A case study in the Upper East Region. *Asian Journal of Research in Computer Science*. Advance online publication. <https://doi.org/10.9734/ajrcos/2024/v17i7491>
- Xia, Q., Weng, X., Fan, O., Lin, T.-J., & Chiu, T. (2024). A scoping review on how generative artificial intelligence transforms assessment in higher education. *International Journal of Educational Technology in Higher Education*, 21, 1-22. <https://doi.org/10.1186/s41239-024-00468-z>
- Yan, L., Greiff, S., Teuber, Z., & Gašević, D. (2024). Promises and challenges of generative artificial intelligence for human learning. *Nature Human Behaviour*, 8, 1839-1850. <https://doi.org/10.1038/s41562-024-02004-5>
- Zhang, Y., & Reusch, P. (2025). Trust in and adoption of generative AI in university education: Opportunities, challenges, and implications. *2025 IEEE Global Engineering Education Conference (EDUCON)*, 1-10. <https://doi.org/10.1109/educon62633.2025.11016490>