

Generative AI literacy: Reframing educational knowledge in the algorithmic age

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The rapid diffusion of generative artificial intelligence (GenAI) has marked a turning point in contemporary education. Tools capable of producing essays, explanations, programming code, images, and summaries are now widely accessible to students and educators alike. Unlike earlier educational technologies that primarily supported access to information or administrative efficiency, GenAI systems can actively participate in the construction of knowledge with users. This shift unsettles long-standing assumptions about learning, authorship, assessment, and academic integrity; and has sparked widespread debate across educational sectors.

Much of the initial discourse surrounding GenAI in education has focused on risks such as plagiarism, student dependency, and the erosion of academic standards. While these concerns are legitimate, they capture only part of the challenge. More fundamentally, GenAI confronts education with an epistemic transformation. When knowledge can be generated instantly and fluently by algorithmic systems, the central educational issue is no longer simply access to information but how learners critically interpret, evaluate, and integrate AI-generated outputs into their own understanding. In this context, knowledge increasingly emerges through interactions between learners, GenAI systems, pedagogical practices, and institutional conditions (referred to as materially-entangled knowledge¹) rather than through individual cognition alone. GenAI literacy therefore emerges as a critical educational priority, essential for enabling learners and educators to navigate materially-entangled knowledge responsibly, critically, and ethically.

Synthesising existing AI literacy scholarship, this commentary advances a critical reframing of GenAI literacy by positioning it as an epistemic and post-digital educational capability rather than a technical or competency-based framework. By shifting the focus from skills to knowledge construction, the manuscript offers a conceptual perspective that helps educators and institutions rethink curriculum, assessment, and academic integrity in the GenAI era (Figure 1).

communicate information in technology-rich environments. However, GenAI introduces a qualitatively different condition: information is no longer merely retrieved but dynamically generated in ways that are interrelated with students' approaches to learning and understanding.

This distinction is consequential. Search technologies direct users toward existing sources that can be evaluated through authorship, publication context, and evidence. Generative systems, by contrast, produce probabilistic outputs based on statistical patterns without inherent intention, understanding, or accountability. This shift destabilises conventional relationships between knowledge, authority, and expertise.

In response, scholars have proposed AI literacy frameworks that extend beyond operational use. Long and Magerko conceptualise AI literacy as encompassing knowledge of how AI systems function, awareness of their limitations, and the capacity for ethical and critical engagement rather than focusing narrowly on skills training.² Recent scholarship refines this further by arguing against a universal GenAI literacy framework but seeing (critical) GenAI literacy as a constellation of situated literacies that are inextricably linked to specific disciplinary, cultural, and socio-political contexts.³ Emerging research further points to the need for learners to develop epistemic agency when interacting with GenAI, including the ability to critically interrogate outputs, recognise biases, and make informed judgments about the reliability of AI-generated knowledge.^{1,3} Consequently, GenAI literacy cannot be limited to operational proficiency. It must include a robust understanding of the system's architecture, its limitations, and the cognitive, ethical, and social dimensions of human-AI interaction. GenAI literacy thus represents an evolution of digital literacy toward a more explicitly epistemic orientation that addresses how knowledge is produced, represented, and evaluated in algorithmic environments.

UNDERSTANDING THE NATURE AND LIMITS OF GenAI

A core component of GenAI literacy lies in conceptual understanding. Many users interact with GenAI systems daily while holding misconceptions about their capabilities. Despite appearing conversational and coherent, these systems do not reason, verify truth, or possess understanding. They generate outputs by predicting likely word sequences based on patterns learned from vast datasets.

This distinction is pedagogically significant. Research indicates that learners frequently attribute intelligence, intentionality, and authority to AI outputs due to linguistic fluency. Such perceptions can foster overreliance and uncritical acceptance, particularly among novice learners who lack strong disciplinary schemas. GenAI literacy must demystify AI. Students should understand why hallucinations occur, how training data shapes outputs, and why fluency (grammatical correctness) should not be equated with factuality (truth).

CRITICAL EVALUATION IN THE ERA OF SYNTHETIC TEXT

The proliferation of machine-generated language has weakened traditional cues used to evaluate information quality. Historically, text quality served as a proxy for information reliability: poor grammar, incoherent structure, or stylistic inconsistency often signalled unreliable sources. GenAI breaks this heuristic by producing highly polished, coherent text regardless of factual accuracy. Consequently, critical evaluation becomes both more difficult and more essential. GenAI literacy foregrounds evaluative judgment as a central learning outcome. Learners must be supported to interrogate AI outputs by questioning assumptions, identifying omissions, and comparing responses with disciplinary standards.^{1,3}

Pedagogically, this partially shifts the cognitive load from producing all text

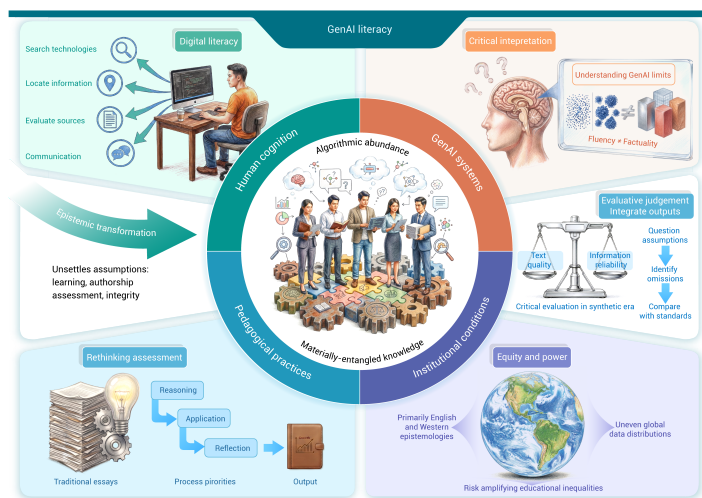


Figure 1. A conceptual representation of GenAI literacy.

FROM DIGITAL LITERACY TO GenAI LITERACY

Educational discussions of literacy have expanded considerably over the past three decades. Digital literacy, information literacy, and media literacy frameworks have sought to equip learners with skills to locate, evaluate, and

to synthesising, editing, emphasising, and verifying. When students are asked to critique, annotate, or revise AI-generated responses, they have the potential to engage in higher-order cognitive processes. Such practices align with broader educational calls and the need in professional contexts to strengthen students' capacity for evaluative judgment, particularly in higher education contexts.⁴ In this way, GenAI can serve as a catalyst for deeper learning, provided that critical engagement is explicitly scaffolded and students understand the need to constantly check the veracity of AI output.

GenAI LITERACY AND ACADEMIC INTEGRITY

Few issues have provoked as much institutional anxiety as the relationship between GenAI and academic integrity. Automated writing tools challenge assessment practices predicated on independent text production and stable notions of authorship. In response, some institutions have turned toward surveillance technologies or blanket prohibitions, approaches that risk undermining trust and pedagogical coherence. Increasingly, scholars argue that integrity in the AI era cannot be sustained through detection alone. Rather, ethical engagement with AI must be taught, not enforced. GenAI literacy reframes integrity as an educational objective concerned with transparency, responsibility, and reflective practice.

From this perspective, students must learn when AI use is appropriate, how it should be acknowledged, and how human contribution can be articulated. Educators are encouraged to ask how its use supported or undermined learning rather than asking whether AI was used.

This approach echoes UNESCO's guidance, emphasising transparency, accountability, and human oversight as foundational principles for GenAI in education.⁵

RETHINKING ASSESSMENT IN LIGHT OF GenAI LITERACY

Assessment represents one of the most pressing sites of transformation. Traditional take-home essays and short-answer tasks can now be produced with minimal effort using GenAI, raising concerns about validity and fairness. This necessitates a redesign toward assessments that prioritise process over product.

Recent scholarship suggests that assessment in the AI era should prioritise reasoning, application, reflection, and process over textual output alone.⁴ Tasks that require students to critique AI responses, justify decision-making, or connect learning to authentic contexts are more aligned with meaningful learning.

GenAI literacy supports this shift by legitimising AI as part of the learning environment. When assessment explicitly incorporates AI engagement, students are encouraged to develop metacognitive awareness of their learning processes. Such alignment between literacy and assessment strengthens coherence between curriculum, pedagogy, and evaluation.

EQUITY, POWER, AND KNOWLEDGE REPRESENTATION

GenAI literacy must also address issues of equity and power. Generative systems are trained on uneven global data distributions, often privileging primarily English and Western epistemologies. As a result, AI outputs may marginalise local knowledge systems and reinforce existing inequalities.

Without critical awareness, learners may interpret AI-generated knowledge as neutral or universal. GenAI literacy therefore includes recognising that technology is socially situated rather than value-free. This requires adopting a postdigital perspective, which acknowledges that the virtual operations of AI have tangible material and relational consequences, from the invisible labour of data workers to computational infrastructures. Students must be encouraged to ask whose voices are represented, whose are absent, and how algorithmic systems reflect broader structural conditions. Access further complicates equity. Differential availability of advanced AI tools risks amplifying educational inequalities, making institutional responsibility central to ethical implementation.⁵

EDUCATORS AND INSTITUTIONAL RESPONSIBILITY

While student capability is crucial, GenAI literacy cannot be realised without sustained investment in educator development. Many teachers and academics are expected to respond to AI-related challenges amid uncertainty, limited training, and rapidly evolving tools.

Professional learning should prioritise pedagogical reasoning rather than technical mastery. Educators need opportunities to explore how GenAI reshapes learning outcomes, disciplinary practices, and assessment design. Because GenAI literacy is "situated", educators cannot simply rely on generic AI training.³ They must explore how GenAI reconfigures the specific knowledge practices and relational pedagogies of their own disciplines. This means that the educator's role becomes more (not less) important in AI-enhanced environments, as ethical judgment, contextual interpretation, and relational pedagogy remain fundamentally human responsibilities. Institutions must therefore support coherent policy, professional learning, and curriculum alignment rather than leaving individual educators to navigate transformation alone.

CONCLUSION: GenAI LITERACY FOR AN UNCERTAIN EDUCATIONAL FUTURE

GenAI is not a transient disruption but a structural transformation in how knowledge may be produced, critically evaluated, and integrated. In this context, GenAI literacy is not an optional enhancement but a foundational educational responsibility. When approached pedagogically and is intended to help students intensify their critical thinking capabilities, GenAI becomes a catalyst for rethinking what education is for. GenAI literacy can empower learners to interrogate authority, navigate uncertainty, and retain human judgment in an age of algorithmic abundance. In this context, literacy extends beyond reading and writing to understanding how text is generated, why it appears persuasive, when it must be questioned and what parts to trust. By embracing a critical, postdigital stance, education can ensure that learners remain active architects of meaning rather than passive recipients of algorithmically produced content.

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DECLARATION OF INTERESTS

The author declares no competing interests.