



Critical GenAI Literacy: Postdigital Configurations

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Abstract

Critical Generative Artificial Intelligence (GenAI) literacy cannot be reduced to a universal framework. Rather, it must be understood as a constellation of situated literacies, shaped by disciplinary perspectives, socio-political contexts, and technological affordances. This multi-authored article explores the emerging concept of critical GenAI literacy and its postdigital configurations. Fourteen authors contributed with different sections, followed by five author-reviewers who examined the article as a whole. The objective was to invite diverse perspectives, constructive critique, and promote collaborative efforts to develop a clearer and more inclusive understanding of critical GenAI literacy. The introduction focuses on establishing some initial assumptions about what we mean by ‘critical’ in general, and for GenAI literacy in particular, and why a conjunction of postdigital configurations of the construct emerges as an adequate methodological solution. In the main part of the article, some authors focus on the concept of ‘literacies’ as a starting point for their reflection, while others directly examine critical GenAI literacy through a postdigital perspective. We conclude that critical GenAI literacy requires moving beyond technical skills to engage with AI’s epistemological, ethical, and relational dimensions, ensuring learners critically interrogate its role in knowledge production. Future inquiry should focus on integrating this literacy into education in ways that promote social justice, epistemic diversity, and democratic participation.

Keywords Generative artificial intelligence · GenAI · Postdigital · Critical literacy · Education · Collective writing

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Introduction (Chrysi Rapanta)

Generative Artificial Intelligence (GenAI) introduces unique challenges and opportunities that demand specialized attention and practice-orienting frameworks (Bozkurt et al. 2024). GenAI actively produces outputs that *appear* novel, often blurring the lines between human and machine authorship, even though they are fundamentally derived from existing corpora, raising new ethical dilemmas, and amplifying the risks of misinformation and bias. As GenAI becomes more integrated into education, the workplace, and public discourse, specific frameworks must exist to equip individuals to critically engage with and assess the GenAI outputs. This involves understanding how GenAI works and fostering skills to evaluate its outputs in context, question their creativity and originality, and recognize their limitations. Frameworks focused on critical practices are vital to ensure that users engage with GenAI in ways that enhance knowledge, uphold ethical standards, and promote societal well-being in a world where AI is increasingly entwined in people's lives.

This paper initiates a dialogue on the essential capabilities individuals require for using AI literacy critically in educational contexts. We especially focus on GenAI and how both teachers and learners can use it in a critical and informed manner. The objective is to create a platform that welcomes diverse perspectives, constructive critique, and collaborative efforts to develop a clearer and more inclusive understanding of critical GenAI literacy. Employing a dialogical knowledge-creation approach, our team of 14 co-authors, representing various disciplines, conceptual frameworks, career stages, countries, and genders, engaged in a structured written discussion. Through a blend of independent and collaborative written exchanges, we sought to generate a broad spectrum of ideas, foster constructive critique, and collaboratively conceptualize the key components and areas of manifestation of GenAI critical literacy.

Why Should GenAI Literacy be Critical?

AI is neither (totally) artificial nor (totally) intelligent. As compared to the so-called Good Old-Fashioned Artificial Intelligence (GOF AI), the AI we currently have is narrow in the sense of limited machine learning (Haugeland 1989). GOF AI attempts to model intelligence through explicit symbolic representation and rule-based reasoning, while modern AI learns patterns from many types of data. For example, GenAI harvests data from text, images, audio, and video, user input (i.e., queries), its own output, users' behavioral data, and metadata. It collects such data without requiring explicit representation of knowledge or reasoning processes. This makes modern AI less intelligent than GOF AI (Broussard 2018) in terms of logical reasoning, explainability, and world modeling, the latter being sacrificed for the rapid statistical optimization offered by modern deep learning technologies.

In fact, the 'depth' of learning does not refer to the learning machines' level of performance, but to the actual depth of the learning architecture, comprising multiple layers, each designed to detect increasingly abstract patterns. This increased

depth and abstraction in deep neural networks is also responsible for many types of errors, including hallucinations (creation of content that seems plausible but is factually incorrect or nonsensical). Another key limitation of machine learning is its generalization capacity. In the words of François Chollet (2017), ‘we are still very far from human-level AI: our models can only perform local generalization, adapting to new situations that must stay very close from past data, while human cognition is capable of extreme generalization, quickly adapting to radically novel situations, or planning for very long-term future situations’. This affirmation is still valid, as modern AI systems fundamentally operate through statistical pattern matching rather than the kind of causal modeling and abstract reasoning that humans employ.

The main function of GenAI tools—arguably generating multimodal content upon human agents’ prompts—can potentially serve as a springboard for developing critical thinking skills, as recent research suggests (e.g., Liang and Wu 2024; Suriano et al. 2025). Yet the epistemological gap manifested in using an uncritical agent to support critical thought remains unaddressed. From a postdigital perspective, critical literacy emphasizes participatory and inclusive practices that resist dominant narratives, especially those perpetuated by Western, colonial, and capitalist frameworks (see Luckett and Bhatt 2024). Large Language Models (LLMs)—the main technology behind most GenAI systems—are built uncritically on these dominant narratives. GenAI’s reliance on human-created data further highlights the technology’s limitations.

GenAI’s outputs should not be treated as ‘masticated food’ ready for consumption, but rather as material that must be critically digested (analyzed for its value) and even rejected if it fails to meet learning objectives. Bayne and colleagues, in their *Manifesto for Teaching Online* (Bayne et al. 2020), stated that ‘[a]lgorithms and analytics re-code education: pay attention!’. Building on this powerful statement, we now add: Algorithms and analytics re-code education *in ways we must understand and embrace to transform our teaching and assessment practices*. In her conversation with Petar Jandrić a year after the *Manifesto* was first published, Bayne affirmed that the leading question is ‘Where does the human teacher leak into the algorithm, and where does the algorithm leak into the human teacher’s practice?’ (Jandrić 2017: 206). The need for ‘algorithmically inflected’ teachers is far more evident today. How should we understand ‘algorithmically inflected’ teachers and learners? What skills should they have and implement to critically interact with GenAI tools and subsequently use their outputs?

The construct of ‘critical thinking’ is one of the most debated and ill-defined in philosophy and education (Lipman 1987). Since its origins in Socratic questioning, it has undergone continuous reimagining by philosophers, educators, and psychologists. From Dewey’s (1910) reflective thinking to the informal logicians’ emphasis on argument evaluation, and from Ennis’ (1993) skills-based approach to Paul’s (1981) focus on intellectual virtues, the concept has evolved through decades of theoretical debate. Some scholars argue that critical thinking requires domain-specific knowledge, while others advocate for its general transferability. Despite efforts to establish consensus, such as the Delphi Report (Faccione 1990), the term remains an umbrella for various cognitive processes, including logical reasoning, creative problem-solving, metacognition, intellectual humility, and information literacy. More

recently, scholars (Kuhn 2019; Rapanta 2019; Rapanta and Iordanou 2023) have emphasized its dialogic nature, shifting the focus from an individual cognitive skill to a social process. Critical thinking, in this view, emerges through engagement with diverse perspectives in dialogue, where individuals coordinate claims, provide evidence, and respond to counterarguments. Argumentation has thus become a means of operationalizing critical thinking, refining its assessment while, as some would argue (see Asterhan et al. 2020), also narrowing its depth and instrumentalizing its value.

This discursive-dialogic perspective aligns well with human-GenAI interactions. Critical thinking plays a role both in conversations with AI and in evaluating the insights generated. Research on educational argumentation identifies various argumentative moves, such as requesting clarification, justification, or counterarguments (Felton and Kuhn 2001), that foster critical engagement. Additionally, GenAI outputs can be assessed using criteria from informal logic, including relevance, sufficiency, and acceptability (Blair and Johnson 1987). For instance, questioning a GenAI-powered chatbot's response for relevance may reveal outdated information. Evaluating the sufficiency of a chatbot's replies determines whether it comprehensively addresses a query, while assessing acceptability involves scrutinizing its sources or their absence thereof. Beyond AI interactions, critical thinking is also essential for democratic participation (Council of Europe 2018). It requires recognizing biases, analyzing assumptions, and situating information within its historical and social context—skills vital for navigating today's complex information landscape.

The skills discussed above are important considerations, but they have limitations as they do not incorporate the philosophical perspective needed to fully understand the nature of critical GenAI literacy. In the next section, we argue that a postdigital framework provides both a suitable and a necessary lens through which to examine this new form of literacy.

Why Do We Need a Postdigital Configuration of Critical GenAI Literacy?

Discussions about GenAI tools and how they (can) influence our teaching, learning, and professional practices are currently ubiquitous. From the OpenAI's ChatGPT 'hype' (Jandrić 2024) to the increased speculation raised by the Chinese DeepSeek (Rudolph et al. 2025), there is still much to cover when it comes to educators and learners being left behind in how, why, and what for such technologies can and should be integrated in the pedagogical practice. Several AI literacy frameworks have been proposed (e.g., Kong et al. 2024; OECD 2025; Sperling et al. 2024) as a solution towards an effective and ethical use of AI. However, these frameworks (1) do not particularly focus on GenAI, and (2) they neglect the critical postdigital configurations necessary to really grasp the nature, possibilities, and restrictions or challenges that GenAI brings to the educational landscape. But why is a postdigital configuration of critical GenAI literacy necessary in the first place?

At the core of the Organization for Economic Co-operation and Development Learning Compass 2030 (OECD 2019), there lies a framework that highlights

student agency defined as the capacity to set goals, reflect, and act responsibly to effect change, supported by *co-agency* through interactions with peers, teachers, families, and communities. According to the same document, agency ‘is about acting rather than being acted upon; shaping rather than being shaped; and making responsible decisions and choices rather than accepting those determined by others’ (OECD 2019: 34). This view of agency resonates well with a postdigital configuration of agency, focusing on what ‘an entity does, rather than something it possesses’ (Thomas 2024). What is more, postdigital agency moves beyond binary views of humans controlling technology or being controlled by it. Instead, it emphasizes complex, distributed, and contested forms of agency that shape our future relationships with technology, politics, and society (Thomas 2024). Subsequently, from a postdigital perspective, agency always implies co-agency, engaging both human and non-human agents in a constant co-construction of knowledge. A question that emerges is whether such co-construction is symmetrical, with humans and non-humans being equally competent and knowledgeable, or non-symmetrical, with either humans or AI being defined as more accountable in the decision-making process (Hodder and Lucas 2017; Siemens et al. 2022).

Talking about the disruptive function of the ‘post’ prefix, Sinclair and Hayes (2019: 128) claim that ‘the work of the post in postdigital will need a thorough grounding in our understanding of the digital’. Similarly, from a critical perspective, understanding posthumanism would imply a thorough understanding of what it means being a human. This simple affirmation may have important implications in the AI-dominated world of education. Using GenAI for teaching and learning purposes would/should imply, in the first place, a thorough understanding of human skills and competences when it comes, for example, to engaging in meaningful discussions, creating consistent and logical answers to questions, and solving problems using multimodal content. Being a human involves having human experiences, which is something that AI lacks. Expressing such experiences in language using *pathos*, *ethos*, and *logos*, simultaneously and alternately according to the circumstances, is still a human-only competence. Algorithmic agency, as expressed in its capacity to process a big amount of data within seconds, is still an AI-only competence. Merging these two competences would be a manifestation of posthuman capacity and capability, not belonging only to one (human) or the other (non-human) agent, but being a product of co-creation and co-agency.

A postdigital configuration of critical GenAI literacy should look at both human and non-human agencies in the co-construction process of output generation, with the human agency being superior when it comes to the ethical acceptability of the final product and with critical thinking being key when it comes to assessing the contribution of AI in the deliberation process. Rather than looking at the symmetry-asymmetry binary, we can start looking at ways to empower humans in this new way of being and learning together with AI, and aim to emancipate humans’ capabilities towards engaging in more productive, creative, and meaningful interactions with these advanced technologies. Such technologies.

are not simply tools that enhance, or not, our educational activities but are also rather part of the complex human and non-human relations that co-constitute

teaching and learning, in ways that resist and defy both the purposes built-in to the technical design, as well as any ‘aims and objectives’ that we might have as teachers or learners (Jandrić and Knox 2022: 783).

In the current era of ‘algorithmic capitalism’ (Peters and Besley 2018) promoted by AI and deep learning, a critical postdigital perspective of GenAI literacy can lead the way against technological determinism and instrumentalism (Hayes et al. 2024).

Why Should We Talk of Multiple Postdigital Configurations of Critical GenAI Literacy?

Dialogue is key in postdigital research. It facilitates collective knowledge production, resists the reductive determinism of digital technologies, and fosters critical engagement with the complexities of contemporary reality. Through postdigital dialogue, researchers can critically examine how digital infrastructures shape knowledge, ensuring that inquiry remains a dynamic, interactive, and socially engaged process (Jandrić et al. 2019b).

This plurality of dialogue, resisting a singular, authoritative voice, also suggests that we should speak of several, rather than one, postdigital configurations of critical GenAI literacy. Critical GenAI literacy cannot be reduced to a universal framework; rather, it must be understood as a constellation of situated literacies, shaped by disciplinary perspectives, socio-political and cultural contexts, and technological affordances. By maintaining a multiplicity of postdigital configurations, we resist the totalizing tendencies of (Gen)AI-driven epistemologies and ensure that critical literacies remain adaptive, reflexive, and responsive to the shifting terrain of technological mediation.

Consistent with the above, the dialogic methodology adopted in this paper draws on collective writing and dialogical knowledge-making approaches, combining independent contributions with collaborative synthesis. This type of dialogical writing approach is well-established in the postdigital research community, because it fosters collective intelligence and relational epistemology, enabling diverse perspectives to converge through collaborative critique and synthesis, which is essential for addressing complex, interdisciplinary challenges in the postdigital era (Jandrić et al. 2023). As Peter McLaren (in Jandrić et al. 2023: 858) notes, ‘critical-dialogical engagement deepens our understanding of issues that require intense deliberation today’.

The process began with the lead author writing a call for papers that served as a trigger for thought and dialogue. Following this, a semi-open invitation was extended to a group of experts representing diverse perspectives, career stages, genders, countries, and disciplines. Each expert wrote a 700-word contribution independently, addressing the central theme (postdigital configurations of critical GenAI literacy) while avoiding groupthink by not consulting others’ contributions during this phase. These initial contributions were then compiled, and the lead author wrote the Introduction. Next, a collaborative phase invited all authors to critically review and provide feedback on the Introduction and the individual contributions, engaging in a polyphonic dialogue (Markauskaite et al. 2022), while two authors prepared an

initial draft for the Discussion and Conclusion. Feedback was integrated, and the lead author facilitated revisions to enhance coherence and alignment. The pre-final phase involved refining the manuscript based on collective input and integrating as many contributions as possible, ensuring that all voices were represented equitably. The manuscript was then sent out to open peer review, and the five reviewers included their critical contributions at the end of the article. This methodology fostered diversity of thought, constructive critique, and shared ownership, creating a richer, more inclusive understanding of the topic.

The main text of this article is composed of ten contributions by different authors, each offering a distinct but complementary postdigital configuration of critical GenAI literacy. To facilitate the readers to recognize the key elements of each configuration, we put them in italics.

A 'Postdigital Literacies' Perspective (Ibrar Bhatt)

Within the postdigital condition, literacy is not only a discrete set of skills but a situated, social, and ideological practice that is embedded in networks of power, agency, and technological mediation. This view builds on the ecological metaphor in Literacy Studies (Barton 1994), emphasizing that literacy is not confined to isolated skills but is interwoven within social life, history, and cultural practices. The emergence of GenAI tools, such as ChatGPT, presents challenges and opportunities for critical literacy, necessitating a re-evaluation of literacy practices using a postdigital lens. As a conceptual foundation, *postdigital literacies* move beyond earlier notions of digital literacy by emphasizing the sociomaterial entanglements of literacy practices (Bhatt 2023, 2024). Building on the ethnographic traditions of Street (1984) and Barton and Hamilton (2012), postdigital literacies are understood as 'patterns of practice' shaped by cultural and institutional forces, where 'literacy events' unfold contingently across overlapping spaces.

Digital technologies are thus seen not as external tools for enhancing literacy but as integral components of literate activity itself (Burnett and Merchant 2020). *The literacy ecology is not just influenced by technology but co-constructed through human and non-human interactions.* This perspective allows us to interrogate GenAI as both an actor in critical literacy practices and as a discursive agent that shapes meaning-making, knowledge production, and critical engagement.

The rise of GenAI systems raises profound questions about authorship, criticality, and agency in knowledge production. Scholars such as Matusov et al. (2024) argue that AI-generated content lacks dialogical self-authorship, meaning that while GenAI tools generate text based on human prompts, they do not engage in meaning-making in a self-reflective or critical way, as a human would. This echoes Escaño's (2024) critique that AI lacks real positionality, a key component of critical pedagogy that allows individuals to situate their knowledge within social, historical, and ideological contexts.

In this vein, *criticality in a postdigital literacies framing is not just about evaluating information but about understanding the material and epistemological conditions of knowledge production* (see Bhatt and MacKenzie 2019). This reflects a

broadier issue in postdigital literacies: the challenge of discerning credible information in environments where knowledge production is automated, decontextualized, and not necessarily led by humans. Therefore, as GenAI tools become integrated into writing, teaching, and learning, critical GenAI literacy must address some key dimensions:

1. *Epistemological awareness.* Understanding how AI-generated knowledge is produced, including biases in training data, and how outputs reflect socio-political conditions. Learners could deconstruct AI-generated texts, comparing them with human-authored texts to *analyze inconsistencies and ideological framings*.
2. *Agency and authorship.* Recognizing the role of human agency in engaging with AI-generated texts while resisting the uncritical adoption of machine-generated knowledge. Learners could rewrite an AI-generated text by modifying its tone, perspective, or characterization to *highlight the role of human intervention in shaping meaning*.
3. *Dialogical engagement.* Fostering reflective and interactive literacy practices where *GenAI tools are not seen as authoritative sources but as co-participants in human outputs*. Learners could engage in a classroom debate where one side defends the view contained in an AI-generated text while the other critiques it using a thesis from a human text. Doing so can foster critical discussions on AI's role in knowledge production.
4. *Postdigital ethics and justice.* Examining the implications of GenAI for equity, access, and power in knowledge production. Learners could analyze AI-generated outputs for biases related to gender, race, or socio-economic status and *propose strategies for making AI-generated knowledge more equitable and inclusive*. Doing so with multiple language prompts and output texts is especially revealing and links with point 1 above.

Postdigital configurations of critical GenAI literacy require an approach that moves beyond digital literacy as mere competency with tools. In the case of critical GenAI literacy, it demands an ecological understanding of critical literacy which involves engaging with the algorithmic, material, and epistemological conditions that shape AI-generated content. At its core, this entails a *metacognitive stance*—an awareness of how AI-generated texts are produced—through which educators can cultivate critical, ethical, and socially conscious engagements with AI-generated texts.

Critical GenAI Literacy in the Age of Promiscuous Knowledge (Ingrid Forsler)

In their book with the same name, Kenneth Cmiel and John Durham Peters (2020) suggest that our digital age is an age of *promiscuous knowledge*, a time in which the line between expert knowledge and other kinds of knowledge has become blurred. This dynamic does not imply a simple rejection of established knowledge systems,

but an ‘ongoing negotiation between elite knowledge producers and those outside the formal system or with no formal accreditation’, reflecting what the authors describe as ‘the simultaneous reliance on and suspicion of expertise’ (Cmiel and Peters 2020: 248). While this ongoing negotiation is not created by digital technologies, it is clearly reinforced by their prevalence (Cmiel and Peters 2020; MacKenzie and Bhatt 2020), echoing accounts of a postdigital condition. The role of the digital in challenging established knowledge structures is evident not least in the increased public access to GenAI systems such as LLMs.

As Bender et al. (2021: 617) point out, LLMs generate text based on occurrence and probability rather than understanding ‘stitching together sequences of linguistic forms [they have] observed in [their] vast training data, according to probabilistic information about how they combine, but without any reference to meaning’. In this stitching, the model does not differentiate between different kinds of knowledge but operates solely on statistical patterns, considering only how frequently certain perspectives or connections appear, not their origin, how they have been constructed, or whether they resonate. By privileging prevalence over validation or ‘truth’, *LLMs and other GenAI systems accelerate the blurring of epistemic boundaries, thus challenging established approaches to content evaluation within critical media literacy education.*

In Sweden, where this text is written, media and information literacy have almost become synonymous with the ‘[c]ritical evaluation of information and information sources’ (Haider and Sundin 2022: 120). In practice, this approach often relies on a checklist method where the reliability of a source is systematically evaluated through key questions such as *Who says what?*, *Why is this being said?*, and *When was it said?*. When engaging with GenAI, however, such assessments become inadequate since GenAI-generated content does not originate from a single identifiable source or author and lacks intrinsic context or intent. Although Sweden’s emphasis on source evaluation might stand out in an international comparison, the limitations of this model can serve as an entry point to discuss possible configurations of critical GenAI literacies in the postdigital age.

One problem with the above approach is that it focuses on sources rather than the ‘information systems that prioritise and provide access to the sources’ (Haider and Sundin 2022: 98). Since GenAI-generated content is assembled probabilistically from existing material, it inevitably reproduces and amplifies the biases and dominant narratives present in this material (Bender et al. 2021). Furthermore, while newer LLMs may provide references for some of the content they generate, it remains unclear how these sources are selected and prioritized. To address the mutual shaping between algorithmic information systems and the broader sociocultural contexts, postdigital researchers have suggested that critical literacy approaches need to find ‘a new balance between the technological aspects of data and AI literacy with the political aspects of data and AI literacy’ (Jandrić 2019a: 34) and ‘incorporate *offline data* to support and make sense of online literacy practices’ (Bhatt 2023: 4).

In the configuration suggested here, such a ‘dual focus’ (Fawns et al. 2023) means *attending to GenAI as a technology that contributes to the blurring of expert and public knowledge, but also simultaneously to the non-digital knowledge systems*

that are being challenged by this postdigital knowledge promiscuity. To critically engage with GenAI and LLMs, we must understand something about how these models are trained, the data they rely on, and the biases embedded in their design, but also engage with the world beyond digital systems, and evaluate ideas rather than sources. This includes relying on established knowledge systems in research, education, and journalism but also opens possibilities for other forms of knowledge such as visual (Escaño 2024), collective (Jandrić and Hayes 2020), or knowledge that emerges in the interaction between humans and machines (Jiang et al. 2024). Ultimately, *the challenge is not just to critique the epistemic disruptions caused by GenAI but also to remain ‘open to what constitutes knowledge’* (Jandrić et al. 2023: 7) and consider its potential role in shaping a more pluralistic and inclusive knowledge landscape.

Algorithmic Literacy as Critical GenAI Literacy (Tiffany Petricini)

Rather than focusing solely on AI literacy—understanding how AI works and interacts with human decision-making—a postdigital configuration of GenAI literacy requires something deeper, namely *algorithmic literacy*. Postdigital perspectives emphasize the digital as no longer a separate or novel domain. This perspective requires an approach to literacy that goes beyond operational knowledge to encompass a critical awareness of how digital systems mediate our world, relationships, and identities. Algorithmic literacy emphasizes a deeper critical awareness of how algorithmic systems shape reality, influence perception, and mediate our interactions with information. This response articulates this distinction by situating algorithmic literacy within literacy in general.

Generally, the term literacy is equated with the ability to read and write text (McBride 2015). UNESCO (2025), recognizing the need for an expanded view, explains that literacy applies to ‘digital, text-mediated, information-rich’ settings. Educational perspectives on literacy move from a narrow focus on decoding and producing written language to embracing ‘multiple literacies’ including visual, media, and digital literacies (see Cervetti et. al 2006; Kellner 1998; Street 2006). These paradigms highlight that *literacy is not just a technical skill, but a social practice shaped by cultural contexts and power dynamics*. Literacy from these paradigms goes beyond comprehension, and learners are empowered to question and transform societal narratives actively.

While numerous definitions of AI literacy have been adapted, Ng and colleagues (2021) utilized an exploratory process to analyze numerous articles that conceptualize AI literacy. They defined it across four core aspects: ‘know and understand’, ‘use and apply’, ‘evaluate and create’, and ‘ethical issues’. This framework is grounded in classic literacy adaptations and inspired by Bloom’s Taxonomy. It emphasizes a progression from foundational knowledge of AI functions to higher-order thinking skills such as critical evaluation and ethical consideration. Ng et al. (2021) found that AI literacy education primarily focuses on enabling learners to interact effectively with AI technologies, understand their applications, and recognize ethical implications. However, while this approach provides a solid foundation for teaching

practical AI skills, it frames AI predominantly as a tool to be used, learned, and ethically managed (see, for example, Sperling et al. 2024).

In contrast, *the concept of algorithmic literacy extends beyond skill acquisition and ethical awareness to interrogate the broader algorithmic systems in which AI operates*. While AI is the system or tool, algorithms are the instructions that tell AI how to work. Unlike AI literacy, which often centers on how to navigate AI technologies, algorithmic literacy demands a critical understanding of how these systems shape communication, influence decision-making processes, and reinforce societal power dynamics. Drawing on Neil Postman's (1993/2011) *Technopoly* and Jacques Ellul's (1964/2021) *The Technological Society*, algorithmic literacy involves recognizing how algorithmic systems function autonomously, often prioritizing internal logic over human needs or ethical considerations. Therefore, while AI literacy equips learners with practical competencies, algorithmic literacy is imperative to foster critical awareness of how algorithms influence knowledge production and cultural norms, highlighting the need for a deeper and more systemic educational approach.

Algorithmic literacy can address the profound epistemic shift in how knowledge is produced, distributed, and consumed in an algorithm-driven world (Petricini [forthcoming](#)). Historically, meaning-making—from oral traditions to print culture—was rooted in human agency, where individuals and communities actively shaped narratives, controlled the flow of ideas, and engaged directly with texts and discourse. However, algorithmic systems introduce a new layer of computational mediation that not only dictates which knowledge is surfaced but also reconfigures the very conditions under which meaning is produced and interpreted. These systems, often designed with efficiency and engagement as priorities, operate through opaque mechanisms that obscure their influence on our perceptions and interactions.

Algorithmic literacy, unlike traditional AI literacy, aligns with the postdigital ethos by not only enabling individuals to understand and use AI tools but also *to critically interrogate the algorithmic structures that govern information flows, influence perceptions, and shape societal narratives*. It challenges the binary of human versus machine, instead proposing an understanding of how algorithms act as mediators of meaning and power. This deeper, more systemic approach to literacy is essential for navigating an era where *algorithms are not just tools but active participants in the creation of meaning and the construction of our shared realities*.

GenAI Literacy Skills for Navigating a Postdigital World (Tomáš Lintner)

GenAI has the potential to revolutionize creative and analytical processes, yet its adoption is fraught with challenges, including systematic gender and racial biases (Zhou et al. 2024). In a postdigital society, these issues demand a rethinking of how we approach human-AI interactions. Human-AI coevolution, where humans and AI algorithms continuously influence each other (Pedreschi et al. 2024), further amplifies these challenges. Trained on biased human data, *GenAI systems risk perpetuating and amplifying societal inequities through a feedback loop that*

normalizes these biases. Breaking this cycle requires more than functional knowledge of AI; it necessitates a critical framework that empowers users to navigate this co-evolving landscape thoughtfully and ethically.

AI literacy has often been framed as an extension of information and computer literacy, focusing on skills such as understanding AI technologies, applying them, and navigating ethical concerns. Frameworks by Long and Magerko (2020), Ng et al. (2021), and Almatrafi et al. (2024) emphasize competencies like recognizing, using, evaluating, and ethically engaging with AI systems. While foundational, these models often treat AI as another tool rather than as a co-evolving agent capable of reshaping human thinking and learning. This ‘tool tendency’ is perhaps unsurprising, as many of these frameworks were developed within computer science paradigms that emphasize functionality and system use, often overlooking the sociotechnical and epistemological entanglements of AI. They fail to fully address the iterative, generative nature of GenAI interactions, and the transformative skills needed for liberating and critical engagement.

GenAI systems, by design, call for a deeper reimagining of literacy—one that equips individuals not just to use AI effectively but to critically engage with its outputs and co-create meaningful interactions. I propose a new framework comprising three essential skills suited to the GenAI context: interrogation, adaptation, and epistemological reasoning. These skills go beyond traditional functional competencies, empowering users to navigate the complexities of human-AI interactions with agency and critical awareness.

Interrogation refers to the ability to critically question and deconstruct GenAI outputs, recognizing the biases, assumptions, and limitations embedded in AI systems. For example, learners may ask: Whose perspectives are amplified or excluded in this AI-generated content? How do the algorithms reinforce dominant narratives or power structures? Unlike traditional evaluation, interrogation expands the scope to include iterative questioning through adaptive prompting, enabling users to probe the underlying patterns and assumptions driving AI outputs. This skill is crucial because it positions learners as active participants who challenge and refine AI systems rather than passively accepting their outputs, fostering a deeper understanding of how these systems shape and are shaped by societal inequities. Equally important is recognizing the limits of what can be interrogated—unexplainable GenAI systems may not reveal how outputs are generated or which data sources they rely on, making some biases difficult to uncover without deeper system-level transparency.

Adaptation is the ability to iteratively interact with GenAI systems, refining inputs and evaluating outputs to achieve meaningful, context-specific results. This skill emphasizes flexibility, creativity, and resilience, recognizing that GenAI outputs are not fixed but evolve through user interaction. For instance, learners might ask: How can my prompts be adjusted to generate more inclusive responses? What patterns emerge from repeated interactions with the system? Adaptation highlights the co-constructive potential of human-AI collaboration, enabling users to harness GenAI’s strengths while mitigating its limitations. By fostering a dynamic, exploratory approach to AI engagement, this skill ensures that users retain control and agency in shaping AI-driven outcomes. At the same time, adaptation includes the recognition

of GenAI's boundaries. Users must be able to identify when the system's outputs are no longer generative or useful for the task at hand when iteration reaches diminishing returns or when critical nuance is lost.

Epistemological reasoning refers to the ability to critically evaluate the nature of AI-generated knowledge and its underlying assumptions. GenAI operates through probabilistic patterns derived from data rather than contextual understanding or intentional reasoning. For example, learners may ask: Does this AI-generated content reflect a specific cultural understanding of the issue? Are its outputs reliable and relevant to the given task or situation? While distinct from ethical considerations, epistemological reasoning incorporates key aspects of AI ethics by addressing transparency, accountability, and fairness. Identifying biases in AI outputs prompts ethical reflection on their societal impact, while evaluating contextual appropriateness aligns with principles of inclusivity and diversity. Additionally, this skill guards against over-reliance on AI by emphasizing the importance of human judgment in decision-making, ensuring that AI systems are used responsibly and equitably. This skill also entails knowing what GenAI cannot know—understanding that statistical patterning is not the same as meaning-making. GenAI systems cannot provide genuine insight into novel or underrepresented issues, and their reliance on dominant data patterns can systematically obscure minority perspectives.

Together, these three skills—interrogation, adaptation, and epistemological reasoning—offer a robust framework for engaging with GenAI in a postdigital society. They transcend traditional notions of literacy by addressing the iterative, co-creative, and epistemologically distinct nature of human-AI interactions. By fostering these skills, educators and learners alike can move beyond functional engagement with GenAI toward reflective, ethical, and transformative use. This approach aligns with the roots of critical pedagogy and postdigital theory, which emphasize the interdependence of technology, agency, and social justice. Critical GenAI literacy is not just a technical capacity but a pedagogical and ethical imperative in a world increasingly shaped by opaque algorithms and automated decisions.

GenAI Literacies as Critical Practice (Karen Gravett)

The rise of GenAI has destabilized education communities, prompting new debates about the nature of knowledge and about what it means to learn. In this contribution, I begin to examine three interwoven questions that can be teased out from these discussions: How might critical GenAI literacies be developed; how should teachers and learners respond to the rise of GenAI; and what might a postdigital sensibility lend to the debate?

Thinking about critical literacy requires us to first understand that literacy practices are not simply skills. Instead, literacies have long been defined more richly as dynamic and situated, and as 'involving both epistemological issues and social processes, including power relations among people, institutions, and social identities' (Lea and Street 2006: 369). GenAI literacies will also involve a complex breadth of dynamic, nuanced, and sociomaterial practices (Gravett 2020). Such a conception matters as it leads us to examine literacies as unfolding within networks of human

and non-human actors. The issue becomes *not about individuals acquiring the 'right' skills to neutralize problems that might accompany technologies but involves a recognition that learners and teachers are 'intra-actively constituted' through material-discursive practices* (Barad 2007: 168). *Crucially, this enables us to avoid calls for skills to be rolled out, within solutionist discourses that responsibilize education as an individualistic matter.*

It also enables us to understand technologies as actors that are situated within power relations, and within a political economy, generating deeper political and economic questions about educational practices. We might seek to develop such situated literacies through examining our engagements with AI as encounters, or *intra-actions*. The question therefore becomes not what skills students need, but what happens when we come to critique and work with the digital within an AI encounter (Bearman and Ajjawi 2023).

Developing literacies in this mode can be understood as part of a more holistic critical practice that can help educators and students to respond to a postdigital educational landscape. Engaging in critical practice can prompt us to ask questions regarding the ways in which we understand education, including the following: What can I notice? Where is power located? What can digital technologies help us to do, where do they come from, and in what ways are they evolving educational practices? And yet, conventional modes of critique have been problematized in recent times, academic habits of criticality being described as stale (Quinn 2024: 12), moralizing (Massumi 2015: 15), even redundant (Stengers 2015).

A critical practice is required to respond to our present times, but it must be a practice that is capable of navigating the complexity and uncertainty of the questions we grapple with. *One response is to adopt a relational critical practice that values messiness and multiplicity.* Latour's (2004: 231) notion of 'matters of concern' offers an approach that can help educators acknowledge uncertainty. Latour (2004: 246) suggests critique should be associated with 'more, not less, with multiplication, not subtraction'. Thinking with multiplication might prompt us to consider: What multiple actors are involved within this AI intra-action? What affordances does Gen AI create but also what challenges? What does technology make happen, conceal or constrain?

Such a mode of relational critical practice (Gravett 2025) might also foster an understanding of the affective, material, and embodied nature of our learning and teaching practices. This might include attuning to notice our engagement with digital technologies within our own learning environments, and inviting questions such as how does the technology make the user feel; or how do values and technologies entangle within situated contexts?

These questions can also be understood through the lens of postdigital sensibility (Fawns et al. 2023). The term 'postdigital' has been used to indicate a time when the digital has become ubiquitous, where technologies are entangled within our everyday lives, and to reject the notion that the digital exists independently of material and social activity (Fawns 2019). *A postdigital approach to GenAI can help educators to examine how GenAI intra-actions unfold within broader networks of human, non-human and material relations.* This relational ontology calls into question human/non-human binaries and casts doubt on the very boundaries, categories,

and identities such binaries underpin. In this way, postdigital inquiry also offers a potentially productive means of enacting a relational critical practice.

Manifesting Critical GenAI Literacy: Empowering Resilience in an AI-Dominated World (Aras Bozkurt)

The rapid proliferation of GenAI in the educational landscape necessitates a critical and reflective approach that transcends simple technical competence. Critically engaging with GenAI means questioning not only its operational mechanisms and capabilities but also its broader societal, ethical, and epistemological implications (Hayes 2023). In an educational context, this engagement challenges both educators and learners to examine how GenAI influences the production and dissemination of knowledge and to assess the underlying biases and limitations inherently embedded within these technologies (Bozkurt et al. 2024). In this regard, the 3wAI Framework—comprising Know What, Know How, and Know Why—provides a structured yet flexible model to cultivate GenAI literacy (Bozkurt 2024). This framework supports a multifaceted understanding that integrates theoretical knowledge, practical skills, and deep ethical reflection which aims to ensure that both educators and students are well-equipped to navigate the complex landscape of human-AI interaction.

Critically engaging with GenAI in education involves a conscious and rigorous inquiry into AI-generated content. It demands that users not only understand how these systems operate but also question the data sources, algorithms, and socio-political narratives that shape AI outputs. Such a process reveals that *GenAI is not an autonomous or neutral agent but a product of human design that mirrors the values, assumptions, and limitations of its creators*. In doing so, educators and learners are invited to recognize that technology plays an active role in shaping our understanding of the world, influencing everything from classroom discussions to broader societal discourses.

Developing a critical understanding of GenAI is essential for educators and learners alike. For educators, it begins with decoding the complex inner workings of AI systems—their learning processes, decision-making mechanisms, and inherent biases. By exposing the limitations and assumptions behind AI outputs, educators help students understand that these outputs are not neutral truths, but products of human design influenced by historical and cultural contexts. Practically, *educators can integrate AI tools into their teaching through activities that prompt analytical inquiry*. For instance, comparing AI-generated texts with human-authored ones can reveal differences in tone, perspective, and underlying assumptions. Such exercises enhance GenAI literacy and sharpen critical thinking by empowering students to question and assess the reliability of AI-produced content. Equally important is addressing the ethical implications of GenAI. *Educators can foster in-class discussions on data privacy, algorithmic fairness, and the potential reinforcement of inequitable power dynamics*. This ethical engagement not only enriches learners' understanding of GenAI but also cultivates a commitment to transparency, accountability, and social justice.

For learners, developing critical literacy in the context of AI means transitioning from passive consumption of information to active, engaged inquiry. Learners must first familiarize themselves with how AI systems operate, understanding that the outputs they see are influenced by historical data and specific design choices. *This awareness is crucial, as it nurtures healthy skepticism and encourages learners to question the origins and reliability of AI-generated content.* Practical engagement, in this regard, is key to transforming theoretical knowledge into actionable skills. Students can participate in projects that require them to use AI tools to generate content, and then critically analyze the results. Ethical reflection also plays a central role in the development of critical GenAI literacy. Learners are invited to consider the broader societal implications of AI usage. This means *engaging in reflective practices that explore questions of fairness, equity, and ethical responsibility.* Such critical engagement prepares students to not only navigate but also shape the discourse around AI in society, which would make them more informed and responsible citizens of a digitally and algorithmically dominated world.

In all, GenAI literacy is vital for resilience in an increasingly technology and AI-dominated world. It empowers individuals in the educational context by providing the agency to critically question, assess, and influence the digital landscape. By equipping both educators and learners with the tools to navigate and challenge AI systems in general and GenAI systems in specific, we foster a community capable of thriving amid technological change which ensures that technology serves as an enabler of informed, ethical, and empowered citizens.

Preparing Teachers for GenAI Literacy in Postdigital Democracy: A Dual-Didactic Challenge (Alex Örtegren)

GenAI reflects the mashup of continuities and ruptures—characteristic of postdigital education (Buch et al. 2024)—extending and transforming educational practices simultaneously. While continuing decades-long attention to AI in education (McCalla 2023), ChatGPT’s public release upended many established principles in teaching and learning (Giannakos et al. 2024). With the first GenAI dust settling, discussions tend to have a narrow focus, for example on assessment integrity and the assumed death of the take-home exam, rather than broader implications. This focus risks reducing GenAI to a technical challenge requiring procedural solutions, which overlooks its impact on knowledge creation and social participation. A more fundamental question is *what GenAI means for the purpose of education, which is not only about students’ engagement with subject matter but their development as members of democratic societies, with K-12 education laying the foundation* (Englund 1986/2005). This question is particularly urgent considering democratic backsliding trends across the world, with serious threats posed by disinformation and polarization (Nord et al. 2025). AI is a key aspect of these developments because it restructures societal structures, ultimately with implications for democracy (Innerarity 2024).

There is therefore a pressing need to discuss how K-12 education fosters GenAI literacy (Bozkurt et al. 2024). GenAI literacy represents a dimension of

the skills and knowledge that members of society need to participate actively and critically in postdigital democracy, where traditional boundaries between digital and offline civic engagement have collapsed. Postdigital democracy is characterized by ‘a totality of relations, actions, and interactions within and generative of socio-technical arrangements through which entanglements of people, digital technologies, and social practices impact society’s affairs’ (Örtegren 2024: 5). Teachers need to provide opportunities for students to engage with GenAI literacy in ways that address democracy beyond chatbots and election interference. In classrooms, this means exploring *how GenAI can influence democratic participation and data-driven responsive democracies but also propagate deep fakes and hate speech—powered by black-box algorithms and entangled with broader societal structures based on who produces and exploits data* (Innerarity 2024). It is therefore crucial that GenAI literacy links to postdigital citizenship (Rapanta 2023), with teachers explicitly referring to social justice and emancipation in teaching and learning activities.

While teachers across school subjects carry some responsibility for addressing the dynamics introduced by GenAI, implications are particularly evident in literacy education. These teachers need to consider *how GenAI is entangled with ‘complex ecologies shaped by social and political-economic forces as well as technological affordances’* (Kalantzis and Cope 2025: 22), *such as datafication, corporate interests, and platformization*. Such critical approaches include considering the imaginaries of knowledge and skills in present and future societies that drive the development of AI technologies. While commercial actors may be well-positioned to influence technological development, educators, researchers, and policymakers play a key role in how we engage with technologies such as GenAI in schools. Without this engagement, literacy education and other school subjects may be shaped by interests diverging from educational values (Nichols et al. 2024; cf. Williamson 2016)—far from fostering the GenAI literacy critical for postdigital democracy.

A postdigital democratic perspective on GenAI literacy highlights how teachers need to engage with pedagogical approaches that move beyond instrumental uses, such as brainstorming or offloading routine tasks (Bae et al. 2024), to consider GenAI’s broader societal implications. To ensure that teachers are equipped for this task, teacher education institutions must provide relevant training (Ng et al. 2024). Here, teacher educators face *a dual-didactic challenge: developing both their own GenAI literacy and simultaneously that of teachers* (cf. Uerz et al. 2018). AI literacy, and particularly GenAI literacy, remains underemphasized in teacher education, overshadowed by a general discourse on ‘critical’ engagement with AI that lacks clear definitions (Sperling et al. 2024). The focus remains on instrumental approaches emphasizing technology use while neglecting its deeper implications for knowledge and society (Aagaard et al. 2024). Addressing this gap is crucial if K-12 education is to fulfill its foundational role in cultivating postdigital democratic citizens. Moving forward requires collaborative efforts that connect GenAI literacy with postdigital citizenship, creating spaces for pedagogies that engage students in critical analysis of AI’s role in shaping democratic processes.

From Bias to Co-creation: Postdigital Strategies for Critical GenAI Literacy in Education (Xiao Xu)

GenAI is reshaping education by enabling personalized learning and dynamic content generation (Suriano et al. 2025). But integrating AI into education requires more than just technical skills; it calls for critical GenAI literacy, which includes deconstructing algorithmic bias, critically interrogating training datasets, designing counter-hegemonic prompts, and practicing relational accountability to ensure knowledge production remains inclusive and equitable. Following postdigital thinkers like Cramer (2015), who emphasize how technologies entangle contradictory trajectories of emancipation and enslavement, we must ask: In a postdigital world where human and AI interactions are deeply intertwined, does GenAI reinforce or disrupt existing power structures?

LLMs, the backbone of GenAI, are trained on vast datasets that reflect systemic biases in race, gender, geopolitics, and economics (Baker and Hawn 2022). These biases are not just technical issues; they represent deeper forms of epistemic injustice, where dominant Western knowledge is privileged while alternative perspectives are sidelined (Bender et al. 2021; Lee et al. 2024). The UNESCO Recommendation on AI Ethics (2022) stresses the need for fairness, accountability, and transparency in AI-driven education. Research further highlights the risks of AI decision-making without human oversight, as unchecked systems can reinforce rather than reduce social inequalities (Ifenthaler et al. 2024).

One major concern is that GenAI often adopts an authoritative tone, obscuring the sociopolitical structures that shape knowledge (Benjamin 2019). AI's reliance on dominant epistemes aligns with Santos' (2018) concept of postabyssal thinking, where Western-centric AI systems erase non-Western ways of knowing. To counter this, critical GenAI literacy must move beyond technical competence toward fostering epistemological diversity, algorithmic transparency, and counter-narrative construction.

A key pedagogical strategy is algorithmic awareness, which helps students understand how data, design choices, and corporate interests shape AI outputs. Matusov et al. (2024) point out that GenAI lacks true dialogue—it can generate responses, but it cannot engage in meaningful conversation. For example, *students can compare AI-generated narratives of colonial history with primary sources from Indigenous scholars, identifying gaps and distortions* (Mohamed et al. 2020). This kind of analysis aligns with decolonial AI frameworks that question AI's epistemic authority and its role in reinforcing dominant narratives.

Students, in turn, must develop critical prompting skills, learning to interrogate AI's representational choices and expose hidden biases (Liang and Wu 2024). Brailas (2024) highlights the potential of postdigital duoethnography as a method for critically engaging with AI, emphasizing reflective, dialogical interactions that reveal both its creative possibilities and epistemic limitations. As prompt engineering becomes an essential skill, structured instruction and practice in AI literacy are increasingly vital (Knoth et al. 2024). Research suggests that

students who develop strong AI literacy not only produce more effective prompts but also engage more critically with AI-generated content (Walter 2024).

Collaborative reflection shifts AI literacy from passive consumption to shared inquiry (Jandrić 2019b). *For instance, in literature classes, students could compare AI-generated summaries of postcolonial novels with expert critiques, examining how AI misrepresents themes of resistance and identity. These discussions help expose AI's epistemic limitations while empowering students to construct counter-narratives* (Freire 1970). UNESCO's AI ethics framework (2022) calls for integrating critical reflection into AI literacy instead of treating AI as a neutral tool. By tasking students with redesigning AI training datasets to include historically excluded voices, educators transform policy mandates into decolonial praxis.

Beyond technical proficiency, GenAI literacy requires relational accountability (D'Ignazio and Klein 2020) *and reflexive positionality* (Hayes 2023). Relational accountability means questioning how our engagement with AI sustains or challenges power imbalances, while reflexive positionality encourages students to examine how their identities shape and are shaped by AI-generated knowledge. *AI's epistemological gap—its inability to engage in true dialogue* (Esaño 2024)—*can itself become a teaching tool*. By making AI's limitations explicit, educators can encourage students to critically analyze AI outputs and deepen their understanding of human agency and knowledge construction.

Ultimately, a postdigital perspective challenges both educators and students to do more than just use GenAI—it calls on them to actively critique and transform these tools. Developing critical GenAI literacy means confronting algorithmic bias, promoting diverse perspectives, and embedding justice, equity, and critical thinking into the learning process. As Jandrić (2019b) argues, by explicitly contrasting thinking-as-action with the neoliberal tendency of acting-to-think, educators emphasize that when students redesign datasets or generate counter-narratives, thinking itself becomes a transformative action rather than a passive response to AI outputs.

Responsible Empathy in GenAI-Driven Immersive Learning Environments (Jack Webster, Laura Ann Chubb, Brian Rodgers, and Christopher Erb)

Immersive learning environments integrate GenAI, among other technologies, with virtual and augmented reality (VR/AR) to create realistic scenarios for education (Wang and Huang 2025). GenAI-powered virtual tutors and simulations are being increasingly utilized in fields requiring relational skills, principally teaching, counselling, and social work (Best et al. 2024; Dai and Ke 2022; Kyrpa et al. 2024; Lanzieri et al. 2021; Lie et al. 2024; Rambaree et al. 2023). While immersive learning environments offer valuable training opportunities, they also raise complex questions about emotional understanding for future professionals in teaching and social services who will work with people experiencing trauma, addiction, chronic illness, and family stress.

Immersive learning environments are shaped by the interplay of digital materiality and digital representation, both redefining knowledge production, communication,

and interaction in contemporary education. Digital materiality refers to how digital entities, despite lacking physical form, exert tangible effects on learning environments and pedagogy (Lacković et al. 2024). Online platforms, virtual classrooms, and GenAI technologies are more than abstract interfaces; they structure engagement, mediate interactions, and influence cognitive and social dynamics. *Digital materiality takes on new dimensions in immersive learning spaces where AI-driven avatars and embodied agents go beyond conveying information; they shape emotional and cognitive experiences in ways that feel real, despite being algorithmically constructed.*

Digital representation concerns how identities, ideas, and educational content are constructed and mediated digitally. Within immersive environments, students and educators engage in self-representation via avatars, video conferencing, and discussion forums, while knowledge is increasingly conveyed through simulations, visualizations, and AI-generated content. These representations do not replicate physical realities but shape how learners interpret and interact with knowledge and emotions in postdigital spaces of learning (Lacković et al. 2024). In this sense, *immersive learning environments are active forces forming part of a dynamic assemblage that co-constructs learning experiences* (Fawns et al. 2023).

This entanglement of the digital and the physical is particularly significant where students encounter digital representations of *simulated empathy*—content produced by GenAI that convincingly replicates human-like interactions modelled on cognitive and affective dimensions of empathy (Diallo et al. 2018; Kurian 2024; Siyan et al. 2024; Zhou et al. 2020). AI-generated interactions challenge traditional models of empathy by overlooking the sensory and physical aspects central to empathic engagement. The disconnect between AI-simulated emotional expressions and genuine human empathy is referred to as the ‘empathy gap’ (Kurian 2023: 4).

AI-driven immersive learning scenarios complicate the ‘empathy gap’ by expressing *illusory embodiment*, where users feel as though a virtual body is their own (Gall et al. 2021). Discussions of the ‘empathy gap’ focus on the limits of AI’s emotional design, but less attention is given to how students perceive, internalize, and respond to AI-simulated emotional interactions. Gall et al. (2021) suggested that illusory embodiment may intensify a person’s emotional processing of the virtual environment, but their findings were preliminary and required validation with a larger sample. Other studies report these interactions feel engaging and personal, giving the experience of ‘being there’ (i.e., telepresence) (Chubb et al. 2023). Results are inconclusive and require further study. However, they suggest that digital representations of the self and others complicate the dynamics of emotional and empathetic understanding—an effect that may be intensified in AI-driven immersive learning environments.

Emotional understanding requires experiences like grief, shame, guilt, or existential anxiety, often nuanced and deeply personal, which GenAI has struggled to handle effectively (Räisä and Stocchetti 2024). Yet immersive learning environments offer opportunities to engage with difficult emotions and create compelling, yet constructed, affective experiences that shape student perceptions (Reiners et al. 2014). We believe it is vital to support learners in developing *responsible empathy*—how users critically interpret and respond to AI-simulated empathy in ways that

acknowledge its artificiality, ethical implications, biases, and cultural boundedness. Immersive AI-driven learning scenarios must be informed by evidence in relational fields and user experiences of simulated empathy to deliver postdigital training environments that improve actual practice. *Our assumption is that by strengthening their own embodied and culturally located understanding of empathy, students will be better equipped to critically engage with AI-driven learning environments as informed participants rather than passive consumers.* This understanding of empathy might be explicitly framed as a component of GenAI literacy. Pedagogy must, therefore, attune students to AI's constructed nature, ethical concerns, and embedded normative worldviews to safeguard the integrity of human emotional experiences central to education.

Examining Teaching and Learning with GenAI Through Postphenomenology (Marguerite Koole)

As educators struggle to cope with questions of academic integrity, cognitive load, creativity, critical thinking, and assessment strategy, it is necessary to ponder the underlying nature of GenAI. Previously, it was easier to differentiate the human from the non-human. Personal computers and mobile devices offer near-ubiquitous access to the Internet. Now with wearable devices and Internet of Things, digital technology has become pervasive and almost imperceptible. Our world has become postdigital in that our digital technologies are now integrated into our world as if they are a natural, human phenomenon ‘noticed only by [their] absence’ (Jandrić et al. 2018a, b: 897). Old and new, analog and digital have become intermeshed. The postdigital gaze has come to focus on how technology is experienced rather than how it is understood conceptually (Andersen et al. 2014). Within this context, Bayne (in Jandrić 2017: 206) suggests that teaching is ‘neither human nor machinic’.

As Mollick (2024) quips, GenAI is an advanced textual predictor system like the autocomplete on a smartphone. He notes, ‘no one is entirely sure why a token prediction system resulted in an AI with such seemingly extraordinary abilities’ (24). GenAI is built on (a subset of) humanity’s collective intelligence, modeled only on language patterns but without any lived experience upon which such intelligence is based. Within its binary 1 s and 0 s, GenAI detects and, in response to queries, *represents* the most probable linguistic patterns. These patterns *appear to signify* facts and information, a nuance that students may not perceive.

From a poststructuralist view, post-qualitative inquiry posits that meaning arises from the relationship between words, and that language does not directly reflect reality (Aagaard and Rosenberger 2024); human discourse only conveys how people talk about experiences but does not convey the experience itself—implying that GenAI produces accurate *re*-presentations of discursive interactions. However, the relationship between words remains undefined.

A postphenomenological approach may be helpful in exploring this relationship between words. While human language is abstract, it is based upon embodied experiences in the world. Language has a referential aspect that is significant for human-technology-nature relations along with implications for meaning and the ethics of

such relations. *AI technologies, alone, do not possess a clear understanding of what their data signifies* (Vallor 2024). *Without experiencing the world, GenAI cannot understand, embody, appreciate or assess either the input or output of its LLMs. It cannot be in a ‘logical space of reasons’ (107) – that is, GenAI cannot justify belief based on reasons, evidence, and/or context.*

In communicating, interlocutors’ embodied experiences can be detected in their choice of words, phrases, styles, and rhetorical devices (Aagaard and Rosenberger 2024). Yet, LLMs contain decontextualized textual datasets from countless, unknown contributors, replete with biases and limitations of the contributors’ utterances. GenAI then detects and emits patterns within the constraints of its algorithmically embedded biases and filters, which are not transparent or easily understood by educators and students.

To better understand the current blurring of the human and non-human in education, a more integrated and experiential approach is needed. Aagaard and Rosenberger (2024) suggest that instead of looking for essences (as in phenomenology), postphenomenologists identify *stabilities* (variation in technology uses and purposes) and engage in *variational cross-examination*. Postphenomenologists can surface the relationships between humans and technology and how they co-constitute new phenomena using Idhe’s (1990) four relations:

1. *Embodiment relations*. How GenAI extends the senses and body and allows the learner to ‘see through’ it.
2. *Hermeneutic relations*. How GenAI and the learner experience alters ‘technological intentionality’ and interpretive understanding.
3. *Alterity relations*. How GenAI is experienced as a quasi-other engaging the learner in a dialogue with the world fading into the background.
4. *Background relations*. How GenAI operates unnoticed in the background making the world more visible but becomes noticeable when it malfunctions.

Postphenomenological analytical tools that can help uncover these relations include (1) examining failures of GenAI, (2) considering how GenAI invites interaction, and (3) understanding the range of relationships between learners, GenAI, education, and the world (based on Adams and Gourlay 2024). Through postphenomenology, scholars might better understand how to assist learners in perceiving nuanced patterns of GenAI output in relation to the world around them and how to assist them in critically examining GenAI biases and filters.

Discussion (Marguerite Koole)

Thinking through and with a postdigital perspective, all authors acknowledge the ontological and epistemological complexity of GenAI entangled within the education assemblage. Most authors express concerns for social justice and ethical practices, not necessarily on the part of learners who ostensibly might be tempted to cheat using GenAI to do their homework, but rather in terms of the biases, quality,

and values of GenAI-curated and reconfigured outputs. Additionally, all contributions articulate the need for active criticality rather than passive adoption of GenAI. Of note, Örtengren's contribution addresses the *imperative* for critical AI literacy—that is, he comments on the significant potential impact upon society. His commentary not only engages with social justice but also draws attention to *social and political-economic forces that may reshape social and democratic practice*.

To address literacy issues, many of the contributors to this collaborative article share models or frameworks to understand GenAI and guide pedagogy. Bhatt notes how patterns of practice interconnect with culture, history, and social interaction. Digital technologies have played and continue to play a significant role in many forms of literacy. Bhatt's contribution focuses on the importance of *metacognitive skills* in critical AI literacy development.

'*Promiscuous knowledge*' is an apt description of the mashup of linguistic patterns and information subsumed within LLMs. Forsler's commentary leads us to contemplate the abstraction of once-contextualized content into a sort of *reduction-and-reexpansion* of information through the detection of patterns and subsequent reconstitution into new, supposedly novel patterns in response to user queries. Forsler concludes that it is important for learners to be able to *reconnect information to its origins*; that is, back to its original context and use, while also understanding the technological infrastructures involved in these epistemic disruptions.

Petricini focuses on *algorithmic literacy*. She posits that people need to understand how algorithms filter, surface, and erase content with direct impacts upon meaning-making. Although she does not overtly mention symmetry, Petricini argues that *GenAI is an active participant* in our learning ecologies. Lintner's contribution corroborates Petricini's point that AI is more than a tool instrumentally supporting human purposes. GenAI can, indeed, operate in a deterministic manner if people lack the ability to *critically interrogate, adapt to, and evaluate the use of GenAI at an epistemological level*.

Also highlighting algorithmic biases, Xu writes about how some data is privileged and held up as authoritative. Privileging English and Western knowledge risks leading to the loss of epistemic diversity—a phenomenon often referred to as *epistemicide*. Xu's work emphasizes the need for *relational accountability* and the use of counter-narrative skills to actively challenge GenAI output rather than passively or unknowingly accept it as good enough. Gravett also proposes a *relational approach* to better understand how human, non-human, and material co-construct the learning ecology. Drawing upon the work of physicist-social philosopher Karen Barad, Gravett further highlights the need for a critical-epistemological examination of Gen AI.

Much of the above-listed critical AI literacy needs are addressed within Bozkurt's 3wAI framework. Bozkurt suggests that by *knowing what, how, and why*, people can begin to understand how GenAI output reflects the values, assumptions, and limitations of LLMs and their algorithms. Bozkurt lists a variety of practical pedagogical approaches to enact the 3wAI framework.

Webster, Chubb, Rodgers, and Erb examine how digital tools such as GenAI *can simulate empathy and give an illusion of embodiment*. This leads them to question the ability of GenAI to assist learners in developing responsible



Fig. 1 A co-constructed postdigital configuration of critical GenAI literacy

empathy. They argue that embodied and culturally informed empathy is more amenable through other pedagogical human practices and tools such as immersive technologies.

Koole's contribution shifts from the need for and characteristics of critical GenAI literacy to how scholars might investigate it. Like Webster et al., Koole posits that GenAI cannot know, appreciate, or justify the meaning of its output because *it cannot directly experience the world*. The *patterned and decontextualized output* of GenAI needs to be examined. She suggests that postphenomenology provides a way to explore the possibilities of GenAI-human co-construction of meaning by examining background, alterity, hermeneutic, and embodiment relations.

Figure 1 depicts how the authors' reflections contribute to a co-constructed postdigital configuration of critical GenAI literacy.

Conclusion (Ibrar Bhatt)

This collective exploration of critical GenAI literacy provides a pragmatic and theoretically grounded foundation for what the concept means and how we can take it forward through teaching and research. The authors suggest a critical rethinking of literacy as more than technical competence or a procedural approach to source evaluation. Central to this re-imagining is a recognition that GenAI systems introduce vast amounts of text into educational and public discourse without clear authorship or accountability. As Bingham (2024) argues, this can lead to a troubling paradox in which students are increasingly asked to assess and take responsibility for claims they may not have authored and thus cannot fully interrogate.

Across the perspectives presented by our contributors, a shared emphasis emerges in response: that critical GenAI literacy must engage deeply with the algorithmic, epistemological, ethical, and relational dimensions of AI systems. This is by no means straightforward and entails dual pedagogical and research inquiry agendas in order for users of GenAI to reclaim agency. The pedagogical agenda focuses on cultivating skills such as interrogation, adaptation, epistemological reasoning, and awareness of exogenous actors who determine whose voices are present and absent in Gen AI systems.

The latter, more research-oriented agenda, attends to better understanding the affective, material, and political entanglements shaping knowledge production in a postdigital world. In this way, rather than approaching AI as a neutral tool, critical GenAI literacy as discussed by our contributors foregrounds the active, iterative role of human and non-human agents in shaping, contesting, and transforming AI outputs. Such a view also compels educators to grapple with the tensions between human meaning-making and AI's probabilistic generation of text, challenging simplistic notions of authorship, agency, and expertise in knowledge ecologies increasingly mediated by algorithmic systems.

Contributors highlight directions for future inquiry in critical GenAI literacy. Such inquiry must explore how critical GenAI literacy can be practically embedded within diverse educational contexts, particularly in ways that center social justice, epistemic diversity, and democratic participation. This includes designing pedagogies that treat AI not as an authoritative knowledge source to which one should uncritically cede power, but as a site for reflective and critical dialogue, ethical questioning, and counter-narrative construction. Equally, expanding research on embodied and affective dimensions—such as empathy and emotional labor—in AI-mediated environments is essential to understanding the full scope of human-AI interaction. As AI systems continue to evolve, so too must our frameworks and research methodologies for critical GenAI literacy, ensuring that learners, educators, and scholars remain reflective, critically engaged, and ethically grounded in shaping a pluralistic and inclusive knowledge landscape.

We would like this article to support researchers and practitioners seeking to engage more critically with generative AI and its place in education. There is, we argue, a sense of urgency and possibility in rethinking AI's role in shaping

knowledge and power, and our contributors have exemplified how critical GenAI literacy must be a key part of this scholarly conversation. Finally, and in the spirit of critical GenAI literacy, we are mindful of our own limitations in perspective and experience, so we hope that this collective discussion will develop further and extend to those who are marginalized in the debates around AI.

Open Review 1: From Black-Boxing to Resilience (Inger-Marie Falgren Christensen, Nina Bonderup Dohn, and Lise Lotte Weilgaard Christensen)

The objective of this multi-authored article is to invite diverse perspectives, foster constructive critique, and promote collaborative efforts to develop a clearer and more inclusive understanding of critical GenAI literacy. Initially, we were not convinced that a distinct critical GenAI literacy—separate from critical literacy more broadly—was necessary. We believed that the current state of affairs stems primarily from misguided approaches to integrating digital technologies in education. These approaches have often emphasized surface-level features, teaching both learners and educators how to operate programs and devices, while black-boxing algorithms and computational processes in the interest of simplicity. There was contentment that black-boxing was acceptable, since the digital technologies served the users' purposes.

Critical literacy is certainly essential for questioning such approaches. At first, it seemed to us that a general critical literacy would suffice as a foundation for 'un-black-boxing' digital technologies and exposing how opaque algorithms infiltrate our digital spaces, collect data, and repurpose it, typically for ends that do not align with users' interests. However, after reading the article, we now see why emphasizing GenAI as a distinct area within critical literacy might be warranted, at least for the time being. This focus may help raise awareness about how GenAI amplifies longstanding concerns. With GenAI, the situation has reached a tipping point. The knowledge construction practices long regarded as central to higher education are now under considerable pressure. We are confronted with a 'burning platform', and must reflect on what we value in education, including where and how GenAI fits into that picture. These are long-overdue discussions, and the article's postdigital framing of critical literacy offers a compelling pathway for moving forward. Thus, the article presents a strong argument for the need for critical GenAI literacy and provides useful insights for its integration into education, as well as directions for future research.

That said, we are somewhat concerned that other serious issues related to AI in education may be overlooked if GenAI is isolated as a unique focus within critical literacy. For example, reactive machine learning, used to build classification models, has been increasingly implemented in educational systems over the past decades to enhance learning analytics and profile student behavior. These models aim to predict academic performance, dropout risk, retention rates, and more, in order to identify so-called at-risk students (Batool et al. 2023; Fahd et al. 2022). Such students may be targeted 'proactively' to prevent attrition, or worse, their profiles may influence

admission decisions, potentially leading to rejection. The ethical implications of these practices are clear: they risk stigmatizing students, generating self-fulfilling prophecies (because educators act on these predictions), and reinforcing severe inequities in educational access and support. In this context, the exclusive focus on critical GenAI literacy may be too narrow, potentially resulting in tunnel vision. This could lead to the neglect, conflation, or subsumption of other crucial issues under the more high-profile concerns associated with GenAI.

We noticed signs of such conflation in several contributions to the article. In some cases, claims about LLMs, AI, or AI literacy are supported by literature that predates the public emergence of GenAI and, in fact, pertains not to LLMs, but to earlier forms of reactive machine learning, such as classification models. More generally, we observed a lack of time sensitivity in some references. Although many cited works are recent, certain arguments about current developments rely on literature published between 2000 and 2020. In a few instances, the absence of references for specific claims may leave curious readers seeking further details without sufficient guidance.

Nonetheless, the article raises critical points regarding the damaging effects of black-boxing, especially in relation to diversity, equity, and inclusion (DEI). As the authors note, GenAI algorithms tend to reinforce Western epistemologies, thereby extending digital colonization rather than contributing to decolonial efforts that aim to elevate non-Western ways of knowing. Some of these challenges have been addressed from a design perspective, with proposals for safeguards to improve DEI—such as input, functionality, and design safeguards (Abdelhalim et al. 2024). Input safeguards, in particular, are vital in addressing the bias-in–bias-out problem.

Efforts to influence and set requirements for the development of GenAI services in support of DEI are undoubtedly important. However, we quite agree with the authors that supporting learners in developing a critical perspective is also needed. We must go beyond teaching what Petricini calls *operational knowledge*, Bozkurt refers to as *technical competence*, and Xu describes as *technical skills*. Instead, a broader critical approach is necessary—one that recognizes technologies not as neutral tools (Xu, Bhatt) or neutral agents (Bozkurt), but as active forces that shape practices and knowledge production. This is where the postdigital perspective becomes especially valuable, offering insight into how technology co-shapes activity, including educational practices, in ways that can both enable and constrain human agency (Hodder 2012).

Understanding how LLMs and algorithms function is essential for grasping the materiality of GenAI technologies. Webster, Chubb, Rodgers, and Erb's concept of *digital materiality* serves as a significant reminder to consider GenAI's impact on learners' experiences within virtual environments. Traditional theories such as *tool mediation* from Activity Theory may fall short here, as they overemphasize human agency and underestimate the powerful influence of non-human actors. A more nuanced understanding is needed—one that considers *more-than-human* events and relationships between human and non-human agents.

The article suggests that future research should explore how critical GenAI literacy might be integrated into education to promote social justice, epistemic diversity, and democratic participation. This is undeniably an important goal. Critical

GenAI literacy could indeed help mitigate the risks posed by current technological trends. Nevertheless, we believe it is also essential to adopt a longer-term perspective that anticipates future technologies. It is worth exploring how to build more resilient educational systems—systems capable of adapting to and experimenting with emerging tools (Hall and Winn 2011; Weller and Anderson 2013).

A resilient approach would foster ongoing critical investigation of new technologies. From a postdigital perspective, such inquiries should focus on possibilities for co-constructing knowledge, rather than engaging in binary debates over whether to ban or embrace a given technology. Indeed, this is in line with Rapanta's argument that 'critical literacies [must] remain adaptive, reflexive, and responsive to the shifting terrain of technological mediation.' In short, while critical GenAI literacy may be a valuable focal point for the present moment, in the longer term, a broader framework of *critical literacies* may better support the development of a resilient and forward-looking education system.

Open Review 2: A Constellation of Critical Explorations into GenAI Literacies (Sandris Zeivots)

It remains tempting to reduce critical GenAI literacy to a universal checklist, yet this paper resists that logic. It enchants the reader into a constellation of postdigital explorations—each insightful, situated, and relational. This constellation serves as a narrative device and a methodological expression of the very epistemic position the paper advocates: plurality of dialogue, context-dependence, and entangled knowledge-making. Despite different starting points, the authors create a kind of postdigital harmony in which tensions are productive, not problematic.

The paper presents distinct yet complementary postdigital configurations—not to be collapsed into coherence but appreciated in their differentiation. This polyphonic structure resists totalising interpretations and instead affirms that critical GenAI literacy is enacted through dynamic interplay: between human and non-human agency, between epistemic authority and distributed authorship, between critique and co-creation. In this sense, the article becomes a microcosm of the postdigital phenomena it theorises.

Relationality is foregrounded throughout. GenAI is treated less as a tool and more as a co-actor that can shape affective experiences in ways that feel real, or give an illusion of reality, in broader learning ecologies. Contributions move us from evaluating GenAI as a content source to grappling with it as a partner in meaning-making—albeit one that is opaque, biased, and power-laden. This reframing invites students and educators to re-claim their agency in evolving postdigital ecologies.

The notion of 'practice' to tackle critical GenAI literacy is crucial. Critical literacy here is not technical competence but a site of social, ethical, and ontological negotiation. It is also, importantly, an evolving practice, marked by uncertainty, paradoxes, and no straightforward solutions. The article's dialogic method models this. The authors are not arriving at consensus but tracing pathways, blurring epistemic boundaries, offering orientations, and inviting readers into inquiry.

If I have a hesitation, it is not with the paper's ambition but with the challenges it poses to readers unfamiliar with the postdigital perspective. The absence of a central synthesis may leave some adrift. Yet this is also its strength: it compels us to think critically not just about GenAI but about how we make knowledge with and through our technologies, each other, and ourselves.

In reading and reviewing this paper, I found myself drawn into its ideas and inquiry. I became part of the very constellation it maps. Critical GenAI literacy, the paper shows us, is not something one acquires. It is something one practises—collectively and relationally—amid the postdigital entanglements. The paper offers italicized takeaways and memorable metaphors (e.g., GenAI outputs are not ‘masticated food’) —the ‘sayings’ of this collective practice (Kemmis et al. 2014). These markers aid comprehension and reflect the authors’ attentiveness to knowledge access.

Reviewing this article *re*-oriented how I see reviewing. I do not stand outside this conversation. While not part of its development, I became—through reading and reflection—part of its relational ecology. The article doesn’t close the conversation. It opens it, and in doing so, it also redefines what it means to review in a postdigital world.

Open Review 3: The Humble Expert (Petar Jandrić)

I have been involved in collective writing experiments since their inception in 2016 (see Jandrić et al. 2022); at present, mostly by supporting others from the position of journal editor. In this capacity, I pay special attention to interlinking different postdigital projects. In this article, the first open reviewer team, Inger-Marie Falgren Christensen, Lise Lotte Weilgaard Christensen, and Nina Bonderup Dohn, are planning their special issue of *Postdigital Science and Education* on designing for literacy in a postdigital world; the second open reviewer, Sandris Zeivots, is the leading author of a forthcoming collectively authored article on ‘Reshaping Higher Education Designs and Futures: Postdigital Co-Design with Generative AI’.

Such interlinking fosters collaboration, transfers knowledge, builds postdigital theory and also its community. Readers of this article, a few years from its publication, may look up these (now) forthcoming writings. This adds a lovely longitudinal quality to this paper; one nice day in the future, this longitudinality will help us historicize our research efforts. One reason why I decided to add my own review to this already very long article is because I wanted to emphasize this point and direct readers to those sources yet unwritten.

The other reason for adding my own review is because this interlinking also carries significant methodological implications. Zeivots, for instance, voices some ‘hesitation’ about ‘the challenges it [the paper] poses to readers unfamiliar with the postdigital perspective’. This is a serious point, as I take accessibility very seriously. However, I take diversity even more seriously: if readers unfamiliar with the postdigital perspective face challenges while reading this text, what kind of challenges may face authors who are unfamiliar with the postdigital perspective? This paper, as Zeivots says, ‘presents distinct yet complementary postdigital configurations – not to

be collapsed into coherence but appreciated in their differentiation’. Are we diverse enough? Should we do something about it?

The depth of expertise is inversely proportional to openness—deeper expertise generally brings about less openness, while more openness brings about less expertise. There are many ways of negotiating this relationship, and movements such as citizen science have, in some cases, managed to achieve very successful compromises between high levels of openness and significant levels of expertise (see Hayes et al. 2025; Jopling et al. 2025). Yet the principle remains—it is impossible to have the cake and eat it too, and it is impossible to have deep expertise and radical openness too. Compromise must be made.

This article’s instigator, Chrysi Rapanta, has firmly positioned the piece at the expert side of the spectrum. Rapanta’s call for contributions has attracted some very deep and knowledgeable postdigital thinkers; as editor, I supported her efforts by inviting just as deep and knowledgeable postdigital thinkers as reviewers. This has resulted in a deep, knowledgeable paper that significantly contributes to postdigital understanding of critical GenAI literacy. This is a legitimate decision on Rapanta’s part, and superbly executed at that—she had a clear concept, and she made that concept happen. Hats off.

Having said that, I do want to insist that ‘[t]here are more things in heaven and earth, Horatio, than are dreamt of in your philosophy’ (Shakespeare 1998). In the words of Katta Spiel (2024: 29), we should be aware of the ‘high horse’ we are standing on and think of our conclusions about GenAI literacy ‘as a steppingstone towards a desired goalpost that by itself might shift and change, embracing the fluidity and messiness of our human lives instead of trying to neatly optimise and rationalise them away’. At the very end, I therefore call for some much-needed epistemic humility. What is in the article, and who wrote the article, is just as important as what is not in the article and who did not participate in the writing of this article. Authors and reviewers did a great job—yet there is much more that needs to be done. So let’s continue our curious dance at the fringes between openness and expertise!

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