

Who Makes the Meaning? Interpretive Authority in AI-Mediated Education

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Abstract

Artificial intelligence in education is not just a technical innovation; it reshapes who makes meaning in classrooms. This article examines interpretive authority in AI-mediated learning and asks where epistemic agency resides when generative systems participate in teaching and learning. Drawing on dialogic pedagogy, self-regulated learning research, and Bronfenbrenner's ecological systems theory, the article introduces the Interpretive Authority Matrix and the Ecological Authority Integration Model (EAIM). The Matrix maps how authority shifts across human-dominant, AI-assistive, AI-directive, and dialogic partnership configurations. The ecological model explains how individual metacognition, classroom design, institutional policy, and sociocultural narratives shape those shifts. Together, these frameworks reposition AI integration as an epistemic design challenge rather than a question of adoption or prohibition. Implications are discussed for instruction, formative assessment, teacher education, educational leadership, and ethical AI integration. By centering interpretive authority, this article argues that responsible artificial intelligence in education depends on preserving human judgment within coherent educational ecologies.

Keywords: Interpretive authority, epistemic agency, artificial intelligence (AI) in education, AI-mediated learning

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AI and the Question of Authority

Artificial intelligence is rapidly reshaping educational practice. Generative systems can draft essays, summarize research, construct arguments, and respond to complex prompts in seconds. In many classrooms, AI is no longer hypothetical. It is present, accessible, and increasingly influential in how meaning is produced (Allen, 2006; Bick et al., 2026). Yet public debates often focus on surface questions: “Should AI be allowed?” “Should it be restricted?” “How should it be detected?” These concerns matter, but they overlook a more fundamental issue. The central question is not whether AI is used, but where interpretive authority resides when it is.

Interpretive authority refers to who is recognized as a legitimate maker of meaning—who defines problems, evaluates responses, and determines when understanding is sufficient. When AI enters instructional spaces, it does more than assist with tasks; it participates in meaning making. Authority may remain primarily human, become negotiated, or gradually shift toward the system itself.

The idea that educational concern about generative AI should center less on productivity and more on preserving learners’ epistemic agency is the central argument advanced by Jose and John (2025), who characterized generative AI as a “surrogate knower.” Their work reinforces the central argument of this article: the critical question is not simply whether AI is used, but where interpretive authority resides when it is.

This article argues that AI integration should be evaluated through the lens of interpretive authority and designed within ecological conditions (Bronfenbrenner, 1979) that cultivate personal agency (Matusov, 2009). If human judgment is not deliberately preserved, efficiency and fluency can gradually replace reflection and discernment. AI integration is, therefore, not merely a technical decision; it is an epistemic design challenge. This perspective aligns with recent scholarship arguing that education should not seek to prevent AI use but to strengthen human epistemic agency through symbiotic partnerships that expand reflection, metacognition, and knowledge construction rather than replace human judgment (J. Wu et al., 2025).

The term *personal agency* is used deliberately. It refers to the capacity of learners at all levels, including K–12 students, preservice teachers, and experienced professionals, to define problems, evaluate evidence, make decisions, and determine when understanding is sufficient. Drawing on dialogic and sociocultural accounts of agency (Matusov, 2009) and research on self-regulated learning (Zimmerman, 2002), personal agency refers to sustained ownership of judgment rather than independence from tools.

To examine how interpretive authority shifts in AI-mediated environments, this article integrates three conceptual tools: the International Society for Technology in Education (ISTE) Standards as normative commitments, the Interpretive Authority Matrix as a diagnostic lens, and an ecological model grounded in Bronfenbrenner’s (1979) systems theory. Together, these provide the foundation for the Ecological Authority Integration Model (EAIM), an integrated framework for analyzing, explaining, and designing AI-mediated learning environments that preserve human agency. The Matrix makes authority configurations visible, the ecological model explains why

they emerge, and together they provide the foundation for the Ecological Authority Integration Model (EAIM).

The ISTE Standards and the Question of Agency

Before examining how interpretive authority shifts in AI-mediated classrooms, it is important to clarify the commitments already articulated within the field. The International Society for Technology in Education (ISTE) has developed widely adopted standards that guide technology integration across K-12 and higher education contexts.

The ISTE Standards for Students (2016) describe learners not as passive users of digital tools, but as:

- Empowered Learners who set goals and reflect on their progress
- Knowledge Constructors who critically evaluate and synthesize information
- Innovative Designers who use technology to solve problems creatively
- Digital Citizens who act ethically and responsibly in online spaces

Similarly, the ISTE Standards for Educators (2017) position teachers as:

- Designers of meaningful learning experiences
- Facilitators who guide student inquiry
- Analysts who use evidence to inform instruction
- Citizens who model ethical technology use

These standards are not tool checklists; they articulate a vision of agency. They assume that technology use should strengthen learner judgment, creativity, reflection, and responsibility, not replace them.

AI requires a renewed examination of this vision. When generative systems can draft essays, summarize texts, and produce arguments, the question shifts. It is no longer simply how students use technology. It is whether students remain the primary decision makers in their learning. In this sense, ISTE provides more than professional guidance. It offers evaluative criteria. If AI use diminishes learner judgment, reduces critical evaluation, or relocates decision making to the system, it conflicts with the standards' intent. If AI use supports reflection, iteration, and deliberate synthesis, it aligns with them.

Rather than framing AI as a choice between adoption and prohibition, the more important question is alignment. If the ISTE Standards articulate a vision of learner and educator agency, educators need a way to determine whether AI use strengthens or weakens that vision. Doing so requires an analytic framework that makes interpretive authority visible. Who defines the problem? Who shapes meaning? Who determines when understanding is sufficient? The Interpretive Authority Matrix provides that lens by revealing how authority shifts between human judgment and AI influence in AI-mediated learning.

Movement Across the Interpretive Authority Matrix

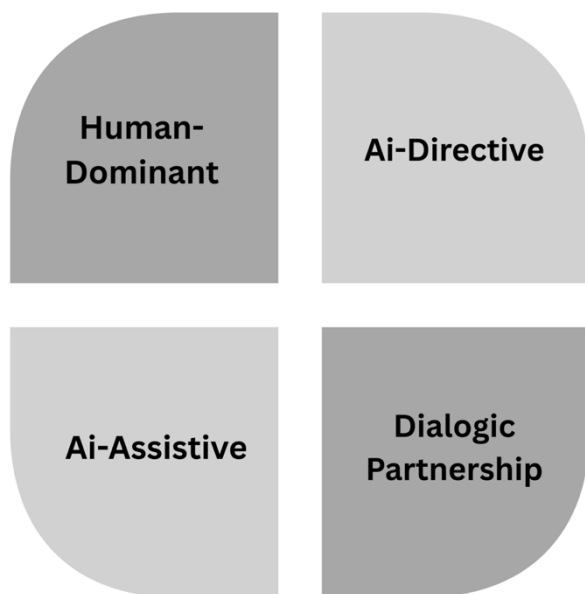
Artificial intelligence does not enter classrooms as a neutral tool. It participates in meaning making, influencing how problems are framed, responses are evaluated, and understanding is judged. The central issue is not simply whether AI is present but rather where interpretive authority resides once it is.

Interpretive authority refers to who is recognized as a legitimate maker of meaning—who frames the task, evaluates responses, and determines what counts as knowledge (Bakhtin, 1981; Matusov, 2009). In AI-mediated environments, authority may remain primarily human, become negotiated, or gradually shift toward the system. Although these shifts are often subtle, they can be made visible.

Rather than reducing AI use to questions of whether it is allowed or prohibited, the Interpretive Authority Matrix identifies four configurations shaped by the relationship between human interpretive agency and AI directive influence (see Figure 1). Movement across the quadrants reveals who is leading the intellectual work and who ultimately determines when understanding is sufficient. Read alongside the ISTE Standards, the Matrix becomes an analytic lens for evaluating whether AI strengthens learner judgment and teacher design or quietly relocates interpretive authority elsewhere.

Figure 1

Interpretive Authority Matrix Model



Human-Dominant Quadrant. In the Human-Dominant quadrant, AI influence is minimal, and interpretive authority rests primarily with the student or teacher. At first glance, this appears to preserve agency. Students draft independently, teachers establish expectations and provide feedback, and meaning making unfolds within familiar classroom structures. Yet, human

dominance does not automatically ensure student agency. Traditional instructional models can still center authority in the teacher, limiting student voice and interpretive independence (Conner et al., 2024; Holquist et al., 2023). A classroom may reject AI while still restricting students' epistemic participation.

AI-Assistive Quadrant. In the AI-Assistive quadrant, students and teachers use AI to support tasks such as brainstorming, outlining, revising grammar, or summarizing content. Interpretive authority remains primarily human, while AI increases efficiency and improves surface-level performance. Although this configuration can enhance productivity, it does not necessarily deepen understanding. Research on digital writing tools suggests that surface-level revision may improve correctness without strengthening conceptual engagement (Helm & Hesse, 2026; Youn et al., 2025).

AI-Directive Quadrant. The AI-Directive quadrant emerges when AI significantly shapes interpretation. Students may rely on generated responses as primary content, prompts begin to direct the argument, and revision becomes acceptance rather than negotiation. As AI influence increases, human interpretive agency declines. The concern is not simply academic dishonesty but epistemic displacement—the gradual transfer of judgment from the learner to the system (Selwyn, 2019; F. Wu et al., 2025). Jose and John (2025) similarly describe AI as a “surrogate knower,” highlighting how algorithmic fluency can replace learners' own processes of justification and critical evaluation.

This configuration conflicts with the core commitments of the ISTE Standards. It weakens the Empowered Learner who sets goals and reflects on progress, limits the Knowledge Constructor who critically evaluates and synthesizes information, and complicates the educator's role as Designer and Facilitator as interpretive authority is increasingly outsourced. Although AI-directive use may appear sophisticated, it can reduce productive struggle, narrow interpretive diversity, and limit the development of metacognitive regulation, capacities closely associated with learning and academic growth (Cheung et al., 2025; Zimmerman, 2002).

Dialogic Partnership Quadrant. The Dialogic Partnership quadrant represents a negotiated balance of authority. AI contributions are neither rejected nor accepted uncritically; they are questioned, revised, challenged, and integrated. Students draft, compare versions, ask why, and justify their decisions (Helm & Hesse, 2026), while teachers intentionally design opportunities for reflection (Nurjain et al., 2026). AI becomes a conversational partner rather than a replacement author (Deliman, 2025).

This configuration aligns most closely with the ISTE vision of agency. Learners set goals, evaluate and synthesize AI-generated ideas, and refine their thinking through reflection and iteration as Empowered Learners, Knowledge Constructors, and Innovative Designers. At the same time, educators fulfill the roles of Designers and Facilitators by creating learning environments in which interpretive authority remains visible, negotiated, and shared.

Dialogic partnership does not eliminate AI influence; it positions AI within a process that preserves human judgment. This reflects Bakhtin's (1981) conception of responsive meaning making, in which understanding develops through engagement rather than passive reception. Similarly, J. Wu

et al. (2025) argue that AI should function as a symbiotic epistemic partner that extends reflection, metacognition, and knowledge construction rather than replacing interpretive judgment. In this quadrant, AI supports reasoning without displacing the learner's responsibility for making meaning.

Reading the Matrix Analytically. The Interpretive Authority Matrix is not a moral ranking. Each quadrant may appear at different moments in instruction, depending on task and design. The Matrix functions as a diagnostic tool. It helps make visible where decision-making power resides when AI enters the learning process. It invites educators to ask:

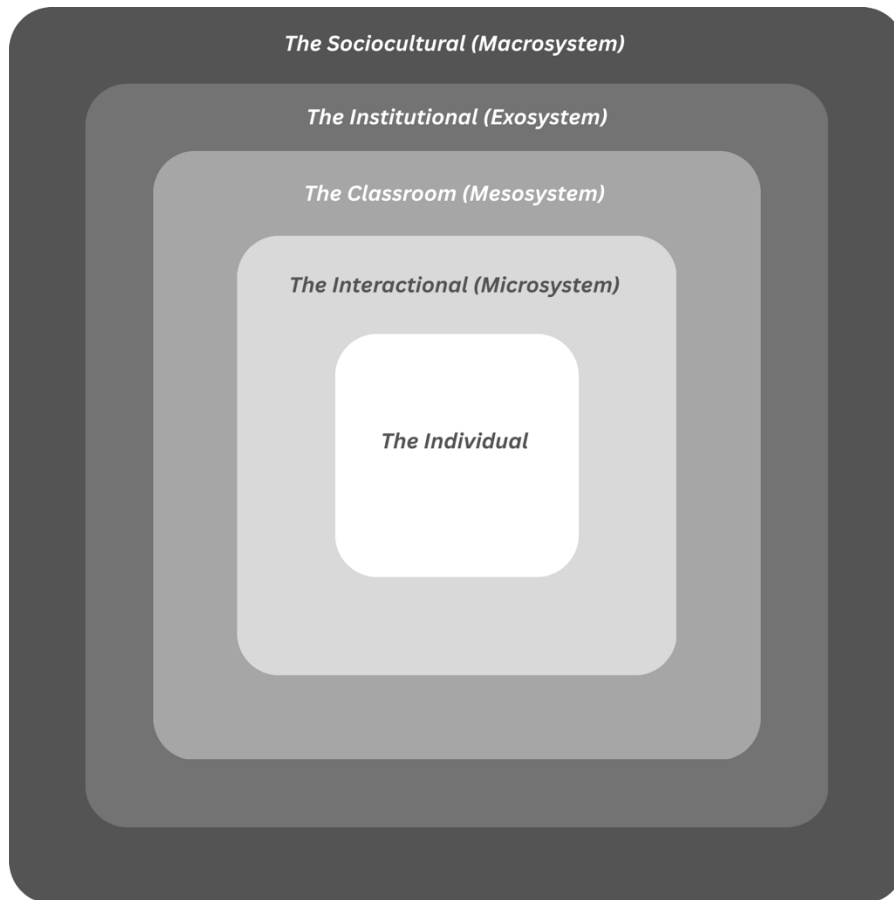
- Where is interpretive authority currently located?
- How is AI influencing judgment?
- Does this configuration strengthen or weaken the forms of agency described in the ISTE standards?

When viewed this way, the ISTE standards become more than broad goals. They become a way to evaluate practice. AI integration is no longer just about allowing or banning a tool. It becomes a question of whether teaching and learning decisions stay aligned with commitments to learner agency, meaningful knowledge building, and intentional design. The Interpretive Authority Matrix helps make those commitments visible in practice. It is important to clarify that the Matrix is descriptive rather than developmental. The quadrants do not form a hierarchy or a fixed progression. Classrooms may move across configurations within a single unit—or even within a single task. AI-assistive use is not automatically shallow, and human-dominant instruction is not automatically agentic. The Matrix does not rank practice. Instead, it identifies patterns of interpretive authority that can be examined critically.

The Matrix identifies where interpretive authority resides during AI-mediated learning, but it does not explain why authority settles in one configuration rather than another. Answering that question requires a broader view of the educational environments that shape human judgment.

Agency Across Educational Ecologies

The Matrix shows where interpretive authority sits in each moment. The ecological model (Figure 2) explains why it sits there. Personal agency in AI-mediated education does not develop in isolation. It forms within nested systems. This layered view draws on Bronfenbrenner's (1979) ecological systems theory, which describes development as shaped by interconnected environments from immediate interactions to broader cultural forces. AI integration, then, is not just a classroom choice. It is an ecological condition.

Figure 2*Agency Across Educational Ecologies*

Layer 1: The Individual. At the center of the ecological model is the individual learner or educator as a thinking and reflective agent. Interpretive authority at this level depends on self-regulation, which is the ability to plan, monitor, evaluate, and revise one's own thinking (Zimmerman, 2002). Research on self-regulated learning consistently shows that students who actively monitor and adjust their thinking demonstrate stronger academic growth and deeper understanding (Panadero, 2017). Whether AI strengthens or weakens interpretive authority depends, in part, on whether it supports or bypasses these metacognitive processes.

Layer 2: The Interactional (Microsystem). In AI-mediated learning, each prompt and response forms a dialogic encounter, the exchange between a human and a generative system. As Bakhtin (1981) explains, meaning develops through engagement with another voice rather than through passive reception. Research on dialogic instruction similarly shows that learning deepens when individuals respond, question, and build on ideas rather than simply accept them (Alexander, 2018; Nystrand, 1997). In AI contexts, the critical issue is whether the learner engages actively or defers to the system (Holmes & Miao, 2023). In AI-mediated learning, the critical issue is whether interaction remains dialogic or becomes directive. When learners engage AI as one voice among

many, interpretive authority remains negotiated; when AI becomes the final authority, it shifts toward the system (Cheung et al., 2025; F. Wu et al., 2025).

Layer 3: The Classroom (Mesosystem). The mesosystem refers to the connections among immediate learning environments, and in schools, this layer is shaped largely by classroom design. Classroom structures connect individual thinking with interactional exchanges. Assignment design, grading criteria, and discourse norms shape whether interpretive authority remains visible. Research on dialogic instruction shows that participation structures influence whose ideas matter (Howe & Abedin, 2013; Nystrand, 1997), while formative assessment research demonstrates that emphasizing process over product strengthens learning (Ahmad et al., 2025; Black & Wiliam, 2009). Classrooms that privilege polished products alone are more likely to encourage AI-directive use (Huang et al., 2025).

Layer 4: The Institutional (Exosystem). Institutions shape classroom practice through policy, accountability systems, leadership priorities, and professional standards (Bronfenbrenner, 1979; Coburn, 2001; Spillane et al., 2002). How leaders interpret the ISTE Standards influences grading, academic integrity, and professional learning, creating the conditions under which interpretive authority is enacted in classrooms.

Layer 5: The Sociocultural (Macrosystem). The macrosystem encompasses the broader cultural narratives surrounding AI, including beliefs about automation, productivity, intelligence, and authorship (Selwyn, 2019; Williamson, 2017). Political priorities, market forces, and professional organizations shape how AI is understood before it reaches classrooms (Au & Ferrare, 2015; AERA, 2023; Holmes & Miao, 2023). Broader commitments to equity likewise influence whether algorithmic bias is interrogated or ignored (Benjamin, 2019; Noble, 2018). These cultural narratives ultimately shape institutional policy, classroom design, and individual experiences with AI.

Integrating the Interpretive Authority Matrix and the Ecological Model

The Interpretive Authority Matrix and the ecological model serve complementary functions in understanding AI-mediated learning. The Matrix is diagnostic: it identifies where interpretive authority resides within a particular instructional episode by mapping the relationship between human interpretive agency and AI directive influence across four configurations—human-dominant, AI-assistive, AI-directive, and dialogic partnership. In doing so, it operationalizes dialogic theories of authority (Bakhtin, 1981; Matusov, 2009), making visible who defines problems, evaluates responses, and determines when understanding is sufficient.

The ecological model explains why those configurations emerge. Extending Bronfenbrenner's (1979) ecological systems theory to AI-mediated education, it identifies the nested conditions that shape interpretive authority: learners' metacognitive capacity, interactional stances toward AI, classroom assessment and discourse structures, institutional policies and incentives, and broader sociocultural narratives about intelligence, automation, and authorship. Research on self-regulated learning, dialogic instruction, and policy implementation suggests that interpretive authority is produced through the interaction of these interconnected systems rather than through individual

choice alone (Alexander, 2018; Coburn, 2001; Dignath & Veenman, 2021; Howe & Abedin, 2013; Panadero, 2017; Spillane et al., 2002).

Together, the two frameworks answer complementary questions: “Where is interpretive authority located?” and “What conditions produce that location?” The Matrix makes authority visible; the ecological model explains why it shifts. Authority configurations are, therefore, not fixed but change across tasks and phases of learning as ecological conditions evolve. When metacognitive supports, dialogic interaction, process-oriented assessment, supportive institutional policies, and cultural narratives position AI as augmentation rather than replacement, interpretive authority is more likely to remain negotiated and human-centered. When ecological conditions instead favor efficiency, compliance, or deference, authority may drift toward AI-directive configurations.

This ecological perspective also reframes agency. Rather than an individual characteristic, agency emerges through interactions among learners, teachers, classroom structures, institutions, and broader sociocultural systems. Kahn et al. (2025) similarly argue that teacher agency is relational, developing through teacher–student dialogue, collective professional practice, institutional culture, and evolving forms of student epistemic agency.

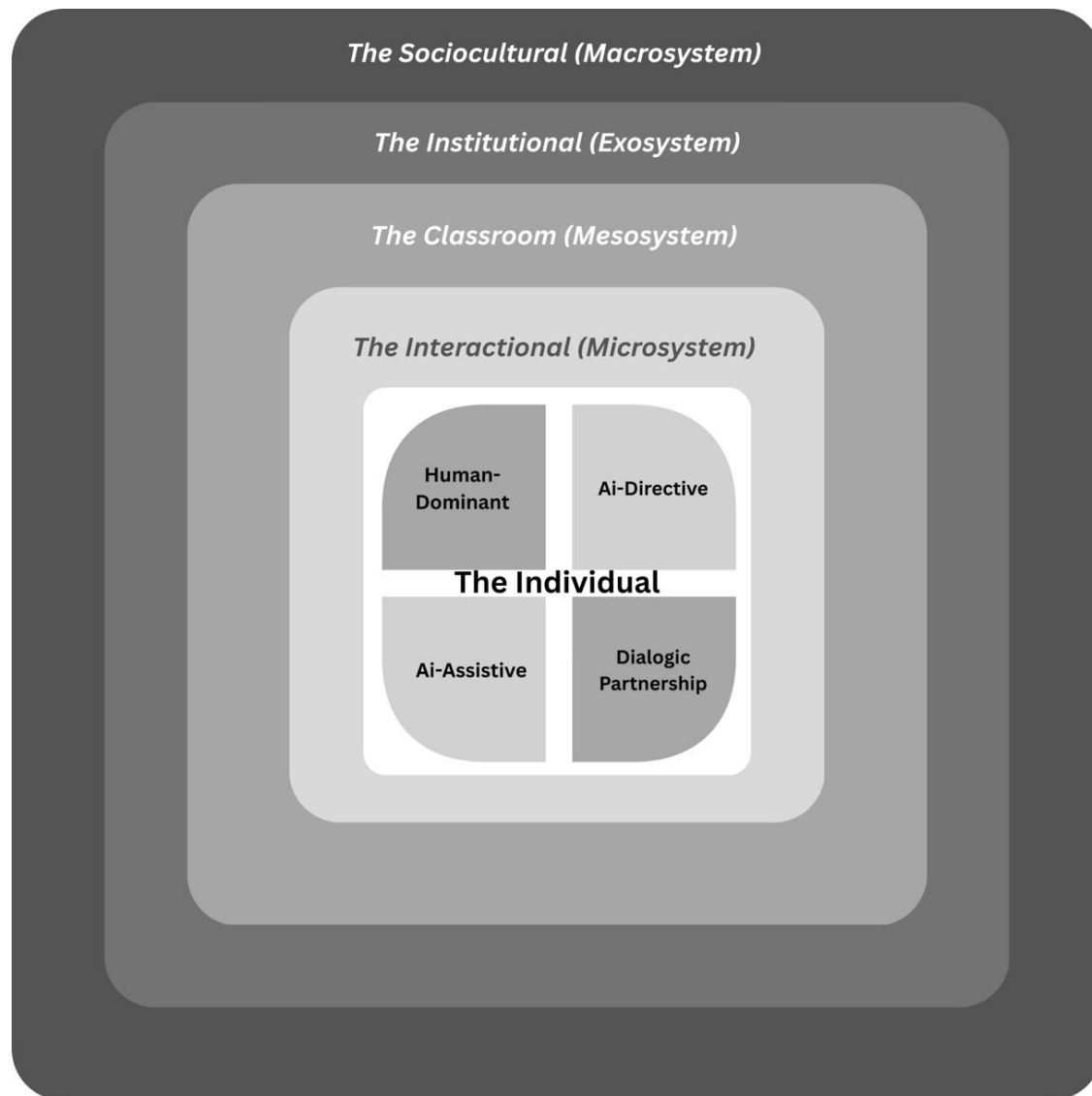
These relationships have important implications for instructional design. Formative assessment research demonstrates that making reasoning and revision visible strengthens learners’ evaluative control (Black & Wiliam, 1998; Nicol & Macfarlane-Dick, 2006), while recent work on epistemic agency argues that thoughtfully structured AI interactions can strengthen rather than diminish human judgment (J. Wu et al., 2025). The design challenge is, therefore, not whether AI is present but whether the ecological conditions surrounding its use preserve learners’ responsibility for interpretation and decision making. AI integration becomes less a question of technology adoption than of systemic coherence across instructional, institutional, and cultural contexts.

If interpretive authority is shaped by ecological conditions, then preserving human agency becomes a matter of intentional design rather than technological control. The question shifts from explanation to action: How can educators design learning environments that sustain dialogic partnership with AI?

Ecological Authority Integration Model (EAIM)

Building on the Interpretive Authority Matrix and Bronfenbrenner’s ecological perspective, this article proposes the Ecological Authority Integration Model (EAIM), an integrated framework for analyzing, explaining, and designing AI-mediated learning environments (see Figure 3). The Interpretive Authority Matrix is descriptive rather than prescriptive. It maps configurations of authority at a given moment without ranking them or assuming a linear progression. A classroom episode may move from AI-assistive use during brainstorming to dialogic partnership during revision. The Matrix makes those shifts visible by showing where interpretive authority resides and how AI directive influence interacts with human agency.

Figure 1
The Ecological Authority Integration Model (EAIM)



The ecological model serves a complementary function. Rather than identifying where authority resides, it explains why authority shifts across configurations. Interpretive authority is shaped by layered conditions, including learners' metacognitive capacity (Zimmerman, 2002), interactional stances toward AI, classroom assessment structures (Black & Wiliam, 2009), institutional policies, and broader sociocultural narratives about intelligence and automation (Selwyn, 2019; Williamson, 2017). The Matrix identifies the configuration; the ecological model explains the forces that produce it.

Together, these perspectives move conversations about AI beyond permission or prohibition. Instead of asking whether AI should be allowed, educators can ask where interpretive authority resides and what ecological conditions are shaping that distribution. The framework also provides

a shared language for teachers, leaders, and researchers to describe classroom practice, examine systemic alignment, and intentionally design learning environments that preserve human agency.

In practice, the EAIM can be applied to a single assignment, a unit plan, an institutional policy, or a teacher education curriculum. Educators might first map a learning activity onto the Matrix to identify where interpretive authority currently resides and then examine the ecological conditions contributing to that configuration. Rather than prescribing a single “correct” quadrant, the EAIM helps explain how authority is distributed and what conditions make dialogic partnership more or less likely.

By integrating descriptive mapping with ecological explanation, the Ecological Authority Integration Model provides a coherent framework for evaluating AI integration while preserving interpretive authority and personal agency. The Matrix identifies where authority resides; the ecological perspective explains why it settles there. Together, they support more intentional analysis, design, and leadership in AI-mediated education.

Designing for Dialogic Partnership. The ecological model makes one point clear: dialogic partnership is intentionally designed, not naturally occurring. When authority drifts toward AI-directive use, the cause is rarely the tool itself. More often, it reflects misalignment across ecological layers—unclear expectations, product-focused assessment, institutional incentives, or unexamined beliefs about what counts as learning.

Aligning AI integration with the agency commitments articulated in the ISTE Standards, therefore, requires designing learning environments that preserve learner judgment rather than replace it. The challenge shifts from controlling AI to shaping the conditions under which it is used. The guiding question becomes: How can AI strengthen human judgment rather than substitute for it?

Designing at the Individual Level. At the individual level, students must remain the primary decision makers. AI should extend thinking, not replace it. Research on self-regulated learning consistently shows that planning, monitoring, and evaluating one’s thinking are central to academic growth (Zimmerman, 2002; Panadero, 2017). More recent work on metacognition likewise demonstrates that learners who actively reflect on their reasoning develop stronger transfer of learning and greater independence over time (Dignath & Veenman, 2021). When AI supplies finished interpretations or arguments without requiring evaluation, agency can weaken. When it prompts reflection, comparison, and revision, it can strengthen metacognitive development.

Design decisions determine which of these outcomes occurs. Students can explain why they accepted or rejected AI suggestions, compare their own drafts with AI-generated alternatives, identify where AI clarified or oversimplified ideas, and reflect on how AI influenced their interpretation. These practices align with formative assessment research demonstrating that learning deepens when students analyze differences, justify revisions, and make their reasoning explicit (Black & Wiliam, 2009; Nicol & Macfarlane-Dick, 2006). In these moments, AI becomes an object of inquiry rather than an unquestioned authority.

These practices embody the ISTE vision of the Empowered Learner. Empowerment is not simply access to digital tools or independent use of AI. Rather, it is the capacity to direct one's own judgment, weigh evidence, and remain responsible for determining what understanding is sufficient.

Designing at the Interactional Level. At the interactional level, AI use should be structured as dialogue rather than substitution. The exchange between learner and system is not neutral; it shapes how meaning develops. Research on dialogic teaching shows that learning deepens when students respond to ideas, question them, and build on them rather than passively receiving information (Alexander, 2018; Howe & Abedin, 2013). The instructional challenge is to ensure that AI-mediated interactions remain intellectually active.

One approach is parallel drafting. Students first compose an independent response, then generate an AI version and compare the two. Drawing on principles of formative assessment, comparison, feedback, and revision deepen understanding by shifting the task from producing text to evaluating reasoning (Black & Wiliam, 2009; Nicol & Macfarlane-Dick, 2006).

Another approach is structured interrogation. Rather than asking AI for final answers, students prompt it for counterarguments, alternative interpretations, or clarification of assumptions. As Bakhtin (1981) argues, meaning develops through engagement with multiple voices. Treating AI as one voice among many—subject to questioning, comparison, and revision—preserves negotiated interpretive authority rather than transferring it to the system (Cheung et al., 2025; F. Wu et al., 2025).

These interactional practices reflect the ISTE Knowledge Constructor standard, which emphasizes critical evaluation, synthesis, and judgment rather than passive acceptance of information. J. Wu et al. (2025) likewise argue that AI should strengthen human epistemic agency by serving as a partner in reasoning rather than a substitute for interpretation. When learners critically interrogate AI-generated ideas, the interaction becomes a site of inquiry where human judgment remains central.

Designing at the Classroom Level. Classroom design plays a central role in sustaining dialogic partnership with AI. The way assignments are structured, participation is organized, and learning is assessed all influence where interpretive authority resides. Assessment is especially important. When grading emphasizes polished final products, students may be incentivized to rely on AI in directive ways. In contrast, formative assessment research demonstrates that emphasizing process, feedback, and revision strengthens understanding and self-regulation (Black & Wiliam, 2009; Darling-Hammond et al., 2017). Evaluating reasoning, not just results, supports intellectual agency.

Making reasoning visible is, therefore, essential. Asking students to compare drafts, annotate revisions, explain decisions, or reflect on AI's influence shifts evaluation from surface correctness to intellectual judgment. Research on feedback and self-regulated learning likewise shows that justifying revisions and explaining one's thinking promotes deeper engagement and greater ownership of learning (Nicol & Macfarlane-Dick, 2006; Panadero, 2017). These structures position AI as a resource for inquiry rather than a source to replicate.

Teachers further sustain dialogic classrooms by modeling inquiry. They can question AI-generated claims, verify information across sources, and weigh competing interpretations. Schön's (1983) work on reflective practice emphasizes making professional judgment visible so learners can observe how decisions are made. Thinking aloud about evidence, uncertainty, and revision helps students develop the same reflective stance in their own interactions with AI.

This work reflects the ISTE expectations for educators as Designers and Facilitators. Rather than monitoring AI use mechanically, teachers intentionally design learning environments in which human interpretation, evaluation, and responsibility remain central. Kahn et al. (2025) similarly argue that teacher agency develops through relational dialogue and shared meaning making rather than isolated expertise. From this perspective, teachers are not simply managing AI, they are designing the conditions under which interpretive authority remains visible and negotiated.

Designing at the Institutional and Sociocultural Levels. Institutional policy shapes what is possible in classrooms long before teachers design assignments. Decisions about acceptable use, academic integrity, grading systems, and professional learning create the conditions under which AI is interpreted and applied. Blanket bans may preserve traditional authority structures, but they do little to cultivate reflective agency. Conversely, uncritical endorsement can normalize dependency and reduce attention to judgment. Research on instructional coherence and professional learning suggests that policies are most effective when expectations, assessment, and professional learning align around shared goals (Darling-Hammond et al., 2017; Lindvall & Ryve, 2019). Policies emphasizing transparency, documentation of reasoning, and reflective AI use are, therefore, more likely to support interpretive agency than those focused solely on detection or restriction.

Institutional leaders also translate the ISTE Student and Educator Standards into local policy. The Student Standards emphasize goal setting, critical evaluation, and responsible decision making, while the Educator Standards emphasize intentionally designed learning rather than passive technology use. How institutions enact these commitments through grading systems, academic integrity policies, and professional learning influences whether interpretive authority remains centered on human judgment.

Institutional decisions are also shaped by broader sociocultural narratives. Selwyn (2019) argues that educational technologies are often introduced as solutions before their implications are fully examined, while Williamson (2017) notes that digital innovation is frequently framed through discourses of efficiency, modernization, and competitiveness. When AI is positioned as replacement intelligence, deference can become normalized. When it is framed as augmentation that extends human thinking and invites critique, educational design is more likely to emphasize partnership and responsibility.

Professional organizations reinforce these commitments. The International Society for Technology in Education (ISTE), UNESCO, and the American Educational Research Association (AERA) emphasize human-centered design, ethical participation, and learner empowerment (AERA, 2023; Holmes & Miao, 2023). Recent systematic reviews likewise conclude that effective AI integration depends less on technical proficiency than on teacher agency, pedagogical knowledge, and sustained professional learning that enables educators to exercise informed professional judgment

(Kashif et al., 2025). Institutional leadership is, therefore, not simply about managing technology but about cultivating the conditions under which human judgment remains central.

Across these ecological levels, interpretive authority naturally shifts as learning unfolds. AI may support early brainstorming, become a dialogic partner during revision, and recede as learners synthesize and justify their own conclusions. The instructional challenge is not to control AI but to design ecological conditions that support intentional movement toward dialogic partnership while preserving human judgment. Research on self-regulated learning suggests that this progression depends on gradually strengthening learners' reflective control and evaluative judgment (Zimmerman, 2002; Panadero, 2017).

Dialogic partnership is most likely when these ecological layers reinforce one another. Learners justify their decisions rather than accept AI outputs uncritically. Teachers make reasoning visible and assess process alongside product (Black & Wiliam, 2009; Nicol & Macfarlane-Dick, 2006). Classroom dialogue normalizes questioning and critique (Alexander, 2018). Institutional policies reward documentation of reasoning, while broader cultural narratives position AI as a partner in thinking rather than a replacement for it. When these conditions align, interpretive authority is more likely to remain negotiated and human centered; when they do not, authority may drift toward AI-directive configurations.

This progression leads directly to the Ecological Authority Integration Model (EAIM). The Interpretive Authority Matrix identifies where interpretive authority resides within a learning episode, while the ecological framework explains how educational systems shape movement among those configurations over time. Together, they provide an integrated framework for analyzing, explaining, evaluating, and intentionally designing AI-mediated learning environments that preserve human agency.

Ethical and Equity Considerations

Ethical and equity considerations are not separate from the Ecological Authority Integration Model (EAIM); they shape how interpretive authority is exercised across every ecological level. Because AI influences whose voices are amplified, whose judgments are trusted, and how knowledge is constructed, ethical questions are inseparable from questions of interpretive authority.

AI Is Not Neutral. AI systems are not neutral tools. They are trained on large datasets that reflect existing cultural patterns, including bias, exclusion, and unequal representation. Scholars have shown how algorithmic systems can reproduce and amplify social inequities, often in ways that appear technical or objective (Benjamin, 2019; Eubanks, 2018; Noble, 2018). Emerging research on generative AI raises similar concerns about reinforcing dominant linguistic norms and marginalizing minoritized perspectives (Bender et al., 2021; Birhane et al., 2022). Although this article does not attempt a comprehensive review of that literature, questions of bias, voice, and representation are central to interpretive authority.

If AI shapes how problems are framed, arguments are summarized, and evidence is presented, it also shapes whose perspectives are amplified and whose are marginalized. Interpretive authority, therefore, concerns not only who makes decisions but also whose voices are recognized as credible

and legitimate. From this perspective, the ISTE Digital Citizen standard requires more than responsible tool use. It calls for critically examining AI-generated content by asking whose assumptions are embedded in a response and what perspectives may be missing.

Equity also involves access and dependence. Unequal familiarity with AI tools, differences in connectivity, and uneven digital fluency can widen educational disparities. At the same time, overreliance on AI may limit opportunities to develop the self-monitoring and evaluative capacities that support long-term learning (Zimmerman, 2002). Ethical AI integration, therefore, requires transparency about when and how AI contributes to learning, along with open discussion of its limitations (Selwyn, 2019). The goal is not alarm but discernment.

Ethics Across the Ecology. Because interpretive authority is shaped by ecological conditions, ethics functions as a cross-cutting design principle rather than an additional ecological layer. Ethical AI integration extends beyond concerns about bias, privacy, or surveillance. Recent systematic reviews argue that responsible implementation also requires attention to transparency, governance, fairness, professional responsibility, and the conditions under which human authority remains visible within educational decision making (Gouseti et al., 2025). From the perspective of interpretive authority, these commitments shape who exercises judgment, how decisions are justified, and whose voices are recognized as authoritative.

For learners, ethical engagement begins with critically evaluating AI-generated responses rather than accepting them as objective. Digital literacy research likewise emphasizes that responsible participation requires questioning sources and recognizing perspective (Wineburg & McGrew, 2017). Ethical awareness, therefore, becomes a mechanism for preserving interpretive authority.

Dialogic interaction provides the next safeguard. From a dialogic perspective, meaning emerges through engagement among voices rather than passive reception (Bakhtin, 1981; Alexander, 2018). Questions such as “Whose perspective is represented?” “What assumptions shape this response?” and “What alternatives are absent?” help keep authority negotiated rather than transferred.

Classroom assessment either reinforces or undermines these habits of judgment. When learners explain, revise, and justify AI-supported decisions, reasoning remains visible and self-regulation is strengthened (Black & Wiliam, 2009; Nicol & Macfarlane-Dick, 2006). Policies emphasizing transparency, disclosure, and reflective AI use likewise reinforce human-centered authority, whereas policies focused primarily on detection or productivity risk normalizing substitution (Gouseti et al., 2025; Selwyn, 2019). Unequal access and infrastructure further shape who is positioned to engage AI critically (Selwyn, 2019).

Finally, broader sociocultural narratives influence how authority itself is understood. When AI is framed as replacement intelligence, deference becomes normalized. When it is framed as augmentation that extends human thinking, critical negotiation becomes the expectation (Benjamin, 2019; Williamson, 2017). Across every ecological level, ethics guides the design decisions that preserve interpretive authority and sustain human judgment.

Implications

AI is no longer hypothetical in education. It is embedded in classrooms, institutions, and policy conversations (Allen, 2026; Bick et al., 2026). The central question is no longer whether AI will be used but how educational systems will respond to its presence. Because interpretive authority shifts when AI enters instruction, AI cannot be treated as a technical enhancement alone. It is an epistemic design challenge that shapes who defines problems, evaluates evidence, and determines what counts as sufficient understanding. Research, leadership, and teacher preparation must respond accordingly.

Research. Much of the early research on AI in education has focused on frequency of use, student perceptions, or performance outcomes. While valuable, these measures do not capture shifts in interpretive authority. More pressing questions concern development over time. How does sustained AI use influence self-regulated learning? Under what classroom conditions does AI strengthen rather than weaken knowledge construction? How do instructional design choices influence movement across the Interpretive Authority Matrix? How do students from different cultural, linguistic, or socioeconomic contexts experience authority shifts in AI-mediated learning?

Answering these questions requires methodological depth. Longitudinal studies can trace changes in judgment and decision making across units or semesters, while discourse-based research can examine how students justify revisions, challenge AI outputs, and negotiate meaning in real time. Research should also extend beyond classrooms. Because development unfolds across nested systems (Bronfenbrenner, 1979), studies should examine how institutional policies align with professional commitments to agency and how ecological conditions shape interpretive authority over time.

Educational Leadership. For educational leaders, AI integration is fundamentally a question of purpose. Policies focused solely on restriction, monitoring, or detection address surface concerns while leaving deeper questions of interpretive authority unresolved. Leadership decisions shape whether AI is understood as replacement intelligence or as a tool that extends human thinking.

Leaders can reinforce agency by supporting assessment practices that value reasoning and documentation, investing in professional learning that models reflective AI engagement, and aligning institutional guidance with the ISTE Standards for Students and Educators. These standards provide a stable reference point for evaluating AI policy against commitments to learner agency rather than efficiency or compliance. When institutional priorities emphasize discernment and responsibility, classroom practice is more likely to sustain dialogic partnership. When efficiency becomes the primary value, interpretive authority may gradually drift toward AI-directed decision making.

Teacher Education. Teacher preparation programs have a critical role because preservice teachers are entering classrooms where AI is already present. Preparing them to recognize and navigate shifts in interpretive authority is, therefore, essential. Teacher education can model dialogic AI engagement, require candidates to analyze AI-mediated tasks through the Interpretive Authority Matrix, and connect instructional decisions to the ecological levels of the EAIM. Drawing on Schön's (1983) conception of reflective practice, preparation should emphasize visible

professional judgment rather than mechanical rule following. Recent systematic reviews likewise conclude that effective AI integration depends less on technical proficiency than on teacher agency, pedagogical knowledge, and sustained professional learning (Kashif et al., 2025).

Preparing educators for AI-mediated learning involves more than developing technical competence. It requires cultivating relational professional agency that enables teachers to negotiate interpretive authority with students, colleagues, and AI systems. Kahn et al. (2025) likewise argue that teacher agency develops through collaborative relationships and institutional contexts. Educators prepared in this way are more likely to design classrooms in which learners remain responsible for making meaning while AI supports, rather than substitutes for, human judgment.

Conclusion: AI as an Epistemic Design Challenge

Artificial intelligence does not simply introduce new tools into education. It introduces new participants in meaning making. The question is not whether AI produces accurate text or efficient feedback. The deeper question is whether interpretive authority remains visible, negotiated, and human centered when AI enters instructional spaces. The Interpretive Authority Matrix makes shifts in authority visible, while the ecological model explains the conditions that produce them. Together, they demonstrate that AI integration is not merely a technical decision but an epistemic design challenge shaped by classroom practice, institutional policy, and broader sociocultural contexts.

Debates about AI often collapse into prohibition or celebration, yet both positions overlook the central issue: how educational systems cultivate or erode human judgment. If interpretive authority gradually relocates to systems optimized for speed and fluency, education risks narrowing into compliance and automation. When AI is structured as a dialogic partner within coherent ecological conditions, however, it can extend reflection, deepen critique, and strengthen human epistemic agency rather than replace it (J. Wu et al., 2025). The implications, therefore, extend across the educational ecology. Researchers must examine how authority develops over time rather than simply measure AI use. Educational leaders must align policy and assessment with commitments to discernment rather than efficiency. Teacher educators must prepare practitioners to design learning environments that preserve interpretive authority while engaging AI critically.

The Ecological Authority Integration Model (EAIM) provides a framework for that work by integrating diagnosis, explanation, and design into a single conceptual lens. AI will remain part of education. The question is not whether schools will use it, but whether they will intentionally design learning environments in which human judgment remains central. Ultimately, the future of AI in education will depend less on the capabilities of the technology than on the educational choices we make about authority, agency, and meaning.

AI Disclosure Statement

Portions of this manuscript were developed through dialogic engagement with generative artificial intelligence tools, specifically ChatGPT (GPT-5.2, OpenAI) and Perplexity. These tools were used as epistemic partners during drafting to test conceptual coherence, refine structure, explore counterarguments, and identify potentially relevant peer-reviewed scholarship for further

verification. AI outputs were treated as provisional contributions to dialogue rather than authoritative claims. All theoretical framing, analytic interpretation, citation verification, and final language decisions were made by the author. Any errors or omissions remain the author's responsibility.

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