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From Empathy to Algorithm: What Remains Human in AI Mediated Education Fields

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ABSTRACT

As artificial intelligence becomes structurally embedded in educational institutions worldwide, the dominant discourse in AIED scholarship has largely treated it as a neutral instrument—a sophisticated tool that enhances learning outcomes without fundamentally transforming the human subjects it acts upon. This assumption, widespread yet critically underexamined, constitutes a foundational theoretical problem that the field has not yet adequately confronted. Existing scholarship capably documents what AI can do and the ethical risks it poses, but offers far less clarity on what AI fundamentally cannot be – and why that limit is ontological and ethical rather than merely technical. Drawing on a PRISMA-aligned systematic literature review of twenty-five peer-reviewed sources, and integrating Noddings' relational ethics of care, Vygotskian sociocultural theory, Aristotelian phronesis, and Foucauldian analytics of power, this study develops the original Human Educational Residual (HER) framework. This framework identifies four irreducible dimensions of pedagogy – ontological presence, phronetic judgment, relational ethics, and cultural-affective attunement – that remain constitutively dependent on human moral agency and cannot be substituted by algorithmic systems regardless of technical advancement. The study further argues that AI-mediated education operates through algorithmic governmentality, quietly reshaping student subjectivity toward efficiency-oriented performance rather than critical consciousness and moral development. These findings carry urgent implications for educational policy, institutional design, and the profession's ethical obligations in an era of expanding algorithmic mediation.

INTRODUCTION

The implementation of artificial intelligence in education and its institutionalization have now become deeply embedded institutional realities. Advances in adaptive learning, intelligent tutoring, and affective computing promise unprecedented levels of scale and personalization. Yet as AI systems increasingly undertake roles historically understood as constitutively human – such as emotional support, relational feedback, and moral guidance – the field exhibits a marked theoretical reticence. Existing scholarship comprehensively documents what AI can do and the ethical risks it poses, but still now there remains a gap and offers far less clarity about what AI might never be, and why that limit is ontological and ethical rather than merely technical.

This study argues that much AI in Education (AIEd) discourse rests on a flawed structural assumption: that the difference between human educators and algorithmic systems is a matter of degree (technical maturity) rather than kind (ontological status). By recasting empathy, care, and relationality as engineering problems awaiting better models and larger data sets, the literature risks a foundational error that misdescribes the very structure of education. It repeatedly identifies symptoms – the superficiality of automated care, the inadequacy of simulated empathy, the irreplaceability of teacher judgment – without diagnosing the underlying condition: irreducible human dimensions that resist algorithmic substitution.

The absence of a clear boundary between the substitutable and the non-substitutable has urgent pedagogical consequences. It enables institutional arrangements in which AI is assigned moral responsibilities it cannot authentically discharge, diffusing accountability in ways that leave students ethically vulnerable. At the same time, the emergence of algorithmic governmentality – data-driven control through design rather than coercion – risks reshaping student subjectivity around measurable efficiency rather than critical consciousness, moral agency, and genuine educational flourishing.

To address this gap, the paper presents a Systematic Literature Review of a bounded corpus of twenty-five peer-reviewed sources on AI in education, AI ethics, empathy-related soft skills, and pedagogical transformation. Moving beyond descriptive mapping of applications, the study synthesizes Noddings' relational ethics of care, Vygotskian sociocultural theory, and Aristotelian phronesis to develop the Human Educational Residual (HER) framework. This original framework identifies four non-negotiable dimensions of pedagogy – ontological presence, phronetic judgment, relational ethics, and cultural/affective attunement – that remain constitutively dependent on human moral agency. By theorizing these human residues, the study advances a rigorous

account of the conditions under which education can remain genuinely educative in an era of pervasive algorithmic mediation.

LITERATURE REVIEW

Adaptive learning systems, intelligent tutoring systems, and learning analytics have expanded rapidly with the advancement of AI-mediated education, all of which promise personalization and instructional efficiency. However, this technological promise is accompanied by a profound pedagogical tension according to recent scholarship: despite assisting with automated repetitive tasks and support differentiated learning, it cannot replicate morality, contextual judgement, and interpersonal relation which refers to teacher-centred teaching (Ninaus & Sailer, 2022; Holmes et al., 2022). In this regard, the role of teacher is not diminished but rather reconfigured, transforming from ethical guidance, community-building, and information delivery toward facilitation (Antara et al., 2025; Chiu, 2024). Human oversight and interpretive agency are increasingly positioned in the literature not as a substitute for educators, but as pedagogical tools.

The limits and reconfiguration of empathy refine this debate. Chatbots, simulated-dialogue environments, and affective computing shown by studies on AI and emotional learning, can assist learners' social and emotional development, providing scalable feedback alongside perspective-taking interventions (Jamaluddin & Mokhtar, 2025; Masih, 2026). Critics prudence that AI frameworks estimate emotional attunement via algorithmic classification rather than subjective interiority, generating outputs that may emerge as intersubjective nurturance whilst retaining systematically instrumental (Aulbach, 2024; Trajkovski, 2026). This distinction is crucial, as educational empathy extends beyond expressive language; rather it is embedded in ethical accountability, reciprocity, and vulnerability. Consequently, the literature resists the claim that AI can substitute empathy, but instead positioning AI as capable of affectively legible or misleading learners remaining context-dependent (Silva & Gonçalves, 2025; Masih, 2026).

There have been ethical issues that have come into focus in current academic discussion. Ethical problems associated with using AI in education involve the violation of privacy, algorithmic bias, surveillance, lack of transparency, and inequality. Such problems tend to arise especially when gathering and analyzing affective data because there is insufficient protection of privacy (Wieczorek et al., 2025; Holmes et al., 2022). In emotionally responsive AI systems, students can be reliant upon or reveal their personal life stories to machines that do not understand human emotions (Aulbach, 2024; Edmondson, 2026). As a result, today's research places importance on human-centered

educational practices combined with AI where technology should serve educational values rather than shape them (Antara et al., 2025; Chiu, 2024). As such, the most compelling argument, therefore, leads to a cautiously optimistic conclusion that what is still uniquely human about education through AI is, among other things, the ability to think, empathize, judge, and be responsible in a manner that algorithms are not able to emulate (Ninaus & Sailer, 2022; Holmes et al., 2022).

RESEARCH GAP

Current AIED scholarship is primarily divided between a functionalist optimism regarding AI's capacity for personalization and critical ethics focused on mitigating algorithmic bias and surveillance risks. However, this corpus exhibits a profound "theoretical reticence" by treating the distinction between human educators and algorithms as a matter of technical maturity rather than ontological status. Existing studies frequently identify "symptoms" – such as the inadequacy of automated care – without diagnosing the "underlying condition": the irreducible human dimensions that resist algorithmic substitution regardless of technical advancement. -This conceptual vacuum is further exacerbated by a Western-centric bias in emotional intelligence models and a neglect of student-lived experiences regarding relational authenticity. These gaps are significant because blurring functional capacity with pedagogical legitimacy produces a "diffusion of accountability," assigning AI moral responsibilities it cannot authentically discharge. Such reductionism risks reshaping student subjectivity toward "algorithmic governmentality," prioritizing measurable efficiency over the critical consciousness and moral flourishing that define genuine education. Consequently, merely refining AI's "soft skills" is insufficient to preserve the conditions of possibility for pedagogy. Addressing this failure, the present study shifts the inquiry from what AI can do and be to what it fundamentally cannot be. By synthesizing relational care ethics, Vygotskian theory, and Aristotelian phronesis, this research develops the Human Educational Residual (HER) framework. This ontological mapping provides a necessary theoretical instrument to safeguard the non-negotiable human core of pedagogy in an increasingly mediated era.

RESEARCH QUESTIONS

Building on these gaps, this review addresses the following questions:
RQ1: How does contemporary AI in Education (AIED) literature conceptualize the boundary between AI's functional capacities and the irreducibly human dimensions of education?

RQ2: Which pedagogical dimensions are most consistently represented as non-substitutable by AI across the reviewed corpus, and how do they correspond to the Human Educational Residual (HER) framework?

RQ3: How do empathy, emotional intelligence, care, and pedagogical judgment emerge in the literature—as technical capacities, relational practices, or ontologically human conditions?

RQ4: What cultural, ethical, and epistemological assumptions shape the literature's understanding of the human–AI relationship in education, and how do these assumptions inform accountability and subjectivity in AI-mediated learning environments?

METHODOLOGY

Research Design

This study adopts a systematic literature review (SLR) to examine how contemporary AIEd scholarship conceptualizes the boundary between artificial intelligence and the human dimensions of education, with particular emphasis on empathy, emotional intelligence, relational care, trust, and teacher–student relationality. An SLR was selected because the central research problem is not intervention testing or statistical aggregation, but conceptual synthesis: the study asks how a bounded body of literature frames, justifies, contests, and limits the substitutability of human pedagogical agency under conditions of AI mediation. This orientation is consistent with the methodological concerns raised by Wiese, Patil, Schiff, and Magana, as well as by Wieczorek, Hosseini, and Gordijn, whose work shows that AI-and-education ethics research requires careful interpretive handling rather than simple descriptive listing.

The review is PRISMA-informed rather than fully database-exhaustive. PRISMA was used as a procedural discipline to support transparent corpus definition, explicit eligibility criteria, traceable screening logic, and systematic reporting of inclusion decisions, even though the study was intentionally limited to a researcher-defined bounded corpus rather than an unrestricted multi-database search. This design is appropriate because the paper's purpose is to produce a theoretically rigorous account of what the literature repeatedly identifies as beyond algorithmic substitution in education, not to establish prevalence estimates or meta-analytic effect sizes. In this respect, the methodological logic aligns with the review strategies of Wiese et al. and the qualitative orientation of Wieczorek et al., both of which emphasize rigor in conceptual analysis and transparent selection criteria.

The choice of a review-based design is further justified by the nature of the available evidence. The uploaded corpus includes peer-reviewed discussions of AI in education, AI ethics, empathy-related soft skills, and pedagogical

transformation, thereby providing a documentary base suitable for secondary qualitative analysis, as seen in the work of Jamaluddin and Mokhtar, Wiese et al., Kong, Cheung, and Tsang, and Wieczorek et al. At the same time, this review does not assume that published scholarship fully represents classroom reality. Wiese, Patil, Schiff, and Magana explicitly note that published studies illuminate early practices and conceptual trajectories, but do not capture the full range of educational activity, much of which remains unreported or methodologically uneven, while Wieczorek, Hosseini, and Gordijn similarly show that AI-and-education ethics literature often combines normative claims, speculative projections, and inconsistent empirical depth. Accordingly, the present review treats the uploaded documents not as a neutral archive of educational fact, but as an analytically bounded corpus through which the literature—particularly in the work of Jamaluddin and Mokhtar, Kong, Cheung, and Tsang, Wiese et al., and Wieczorek et al.—constructs, defends, and contests what remains irreducibly human in education under conditions of AI mediation.

Data Source and Eligibility Criteria

The evidentiary base for this review consisted exclusively of the academic documents uploaded by the researcher, which were treated as the full review corpus for this study. More specifically, the bounded corpus comprised 25 sources, primarily peer-reviewed articles, which together constituted the complete analytical dataset for the review. Because the study is intentionally limited to these documents, the methodology follows a bounded-corpus systematic review logic rather than a database-expansion design. The corpus was read as a coherent scholarly field rather than as a random sample, and its relevance was assessed in relation to the recurring conceptual concerns developed by Jamaluddin and Mokhtar, Wiese et al., and Wieczorek et al. around AI, education, pedagogy, empathy, and ethical responsibility.

Eligibility was determined on the basis of substantive relevance rather than keyword occurrence alone. Documents were included if they engaged directly with AI-mediated education in ways that illuminated socio-pedagogical questions, including empathy, emotional intelligence, human judgment, relational presence, ethical responsibility, or the transformation of the teacher's role. This inclusion logic reflects the screening principles used by Wiese et al., who excluded papers where education or ethics was not a substantive focus, and by Wieczorek et al., who applied explicit inclusion criteria requiring focus on AI in primary and secondary education and its ethical implications. By contrast, materials were excluded from the analytic core if they were predominantly technical, model-centric, or focused on automation performance or system design without sustained socio-pedagogical interpretation. This exclusion rule

was necessary to preserve construct validity and prevent the review from becoming a general survey of AI applications rather than a focused inquiry into what remains distinctly human in education.

Data Extraction and Synthesis

Data extraction was conducted through full-text qualitative coding of the selected documents. Each text was read in full and examined for claims related to empathy, emotional intelligence, teacher–student bonding, pedagogical care, trust, human oversight, ethical judgment, surveillance, bias, personalization, and the limits of AI in educational environments. Full-text coding was preferred because Wieczorek et al. explicitly state that ethics-related implications in AI-and-education literature are often distributed across entire arguments rather than confined to dedicated methods or findings sections, while Wiese et al. also show that review quality depends on alignment between the codebook, conceptual aims, and analytic categories. The extraction process was structured to preserve both consistency and conceptual nuance. Each document was summarized in relation to its main argument, conceptual vocabulary, and position on the human–AI boundary. Particular attention was paid to recurring distinctions in the corpus, such as assistive versus substitutive AI, simulated versus genuine empathy, and personalization versus relational care. This allowed the review to track not only what individual authors said, but how the literature as a whole repeatedly framed the educational significance of human presence, moral accountability, and contextual judgment.

Coding Procedure

The coding process was primarily inductive. Initial codes were generated from the language and argumentative structure of the texts rather than imposed entirely through a fixed prior checklist. This decision follows Wieczorek et al., who deliberately avoided relying only on predetermined ethical checklists in order to prevent narrowing what could emerge from the corpus, even though Wiese et al. used a more deductive codebook approach grounded in the Content, Assessment, and Pedagogy framework. In the present study, open coding first identified recurring motifs such as empathy as relational understanding, AI as assistive rather than substitutive, teacher judgment as context-sensitive, and emotional intelligence as difficult to automate.

These first-order codes were then grouped into broader analytical categories, including relational presence, affective responsiveness, moral discernment, contextual pedagogical judgment, human accountability, and the distinction between simulation and authenticity. These themes were strongly resonant with the concerns raised by Jamaluddin and Mokhtar, Wiese et al., Kong

et al., and Wieczorek et al., all of whom in different ways underscore the persistence of a human boundary that AI cannot simply cross. To strengthen trustworthiness and analytic validity, a clear audit trail was maintained throughout the coding process, and a coding matrix was developed to document code application, category refinement, and cross-text comparison in a transparent and reviewable manner.

DISCUSSION AND ANALYSIS

The literature on artificial intelligence in education has grown rapidly, yet it remains marked by a notable theoretical reticence. Across work on AI ethics, empathy, emotional intelligence, teacher–student relations, and pedagogical change, research carefully documents what AI can do and what it threatens to do, but rarely theorizes with precision what AI can never be. This blind spot rests on an unexamined assumption that the human–AI relationship is mainly a matter of dividing functions: letting machines handle tasks they perform more efficiently while humans retain the rest. Accounts that celebrate AI’s role in empathy training, personalization, or classroom management thus converge on the same structural gap—the distance between what AI can instrumentally perform and what education irreducibly requires.

This study argues that the gap is ontological rather than technical and that ignoring it is a serious theoretical failure. Drawing on phenomenology (Husserl, Merleau-Ponty), Aristotelian virtue ethics and phronesis, ethics of care (Noddings, Tronto), and Foucault’s analytics of power and subjectivity, it proposes the Human Educational Residual (HER) framework: four irreducible dimensions—ontological presence, phronetic judgment, relational ethics, and cultural-affective attunement—each dependent on human moral agency and relational presence. From this standpoint, empathy marks a boundary that affective computing cannot cross; emotional intelligence is a relational-ethical practice rather than an automatable skill; contextual pedagogical judgment exemplifies phronesis rather than probabilistic inference; and delegating care to artificial systems diffuses moral accountability in ways that damage the architecture of the educational relationship. Taken together, these claims do not defend human exceptionalism for its own sake, but delineate the conditions under which education remains genuinely educative—conditions AI may support, but cannot replace.

The Human Educational Residual (HER): An Ontological Mapping of What AI Cannot Touch

The conjecture that artificial intelligence can subsume the education ethics and the empathy of humans in education fields can be argued with the

educational frameworks itself. Education contains four irreducible dimensions that AI cannot substitute—not because technology is insufficient, but because they are constitutively dependent on human ontology, deontic capacity, Ethical autonomy and at times also relational or social co- presence.

The conflation of functional capacity with pedagogical legitimacy is not merely an analytical imprecision — it is a foundational error that misrepresents the ontological architecture of education itself. The predominant discourse in AI in Education (AIEd) has long operated under the presumption that is synchronously pervasive and underexamined: that if an artificial system can demonstrably perform an educational function, it may legitimately substitute for the human performing it.

Education, as theorized within humanistic and relational philosophical traditions from Dewey to Noddings to Freire, is not a set of deliverable functions; it is a practice constituted through moral commitment, mutual recognition, and the sustained co-presence of beings who are genuinely at stake in one another's development. To address this conceptual vacuum, and to provide the field with a theoretically grounded instrument for distinguishing what AI can instrumentally perform from what education irreducibly requires, this review proposes an original conceptual framework: the Human Educational Residual (HER). The HER framework systematically maps four dimensions of educational practice that remain non-substitutable by artificial intelligence — not because current technology is insufficient, but because these dimensions are constitutively dependent upon human ontology, moral agency, and relational presence in ways that no degree of technical advancement can overcome. The four irreducible dimensions of HER are as follows.

Dimension	Definition	Why AI Cannot Instantiate It
Ontological Presence	The existential fact that a human teacher is genuinely at stake in the learner's development, capable of moral failure, and therefore capable of authentic commitment.	AI lacks capacity for moral vulnerability or genuine choice.
Phronetic Judgment	The capacity for practical wisdom that responds to the singular and contextual rather than the general and statistical.	AI operates on pattern recognition and probabilistic inference, not situational wisdom.
Relational Ethics	The enactment of care, trust, and accountability	AI cannot enter moral relationships with

	within sustained relationships that carry genuine moral weight.	genuine reciprocity or continuity.
Cultural and Affective Attunement	The embodied, historically situated, and culturally specific sensitivity to what a particular learner, in a particular moment, within a particular community, genuinely needs.	AI lacks embodied cultural situatedness and lived historical experience.

The first, ontological presence, designates the existential condition in which the teacher is genuinely at stake in the learner's development – capable of indifference, capable of moral failure, and therefore capable, in a morally meaningful sense, of choosing otherwise. It is precisely this capacity for authentic commitment grounded in genuine vulnerability that AI structurally lacks; an AI system that responds to student distress has not chosen to respond – it has been designed to respond, and that distinction is not trivial but foundational to what makes care educationally real.

The second dimension, phronetic judgment, to theorize what the literature consistently describes but never adequately names: the teacher's irreducibly contextual capacity to perceive what a singular situation genuinely requires, to weigh incommensurable values, and to act in ways no algorithmic rule set could specify in advance. Unlike AI's probabilistic pattern recognition, which operates on the general and the statistical, phronesis responds to the particular student in this moment – and it is precisely this orientation toward singularity that renders it formally uncodifiable.

The third dimension, relational ethics, describes the enactment of care, trust, and moral accountability within sustained pedagogical relationships – relationships that carry genuine ethical weight precisely because they bind a human subject who can be held responsible, who can disappoint, and who can demonstrate fidelity across time. AI cannot enter such relationships because it possesses neither moral continuity nor reciprocal vulnerability – the very conditions that make relational trust educationally generative rather than merely functionally adequate.

The fourth dimension, cultural and affective attunement, refers to the embodied, historically situated, and culturally specific sensitivity through which a teacher perceives what a particular learner, embedded in a particular social and

cultural world, genuinely needs — a form of knowing that is inseparable from lived experience, and therefore inaccessible to systems that know the world only as data.

Taken together, these four dimensions constitute not a checklist of desirable teacher qualities but the very conditions of possibility for education in its fullest sense. The HER framework does not position the human teacher and artificial intelligence as competitors for equivalent roles; it reconceptualizes their relationship as a structured complementarity between fundamentally different orders of capacity.

Within this architecture, AI functions as a powerful instrument for scale, adaptive consistency, personalized feedback, and administrative efficiency — capabilities that can genuinely enhance the conditions under which education occurs. The human teacher, however, remains the irreplaceable bearer of the moral and relational conditions within which those instrumental capabilities acquire educational meaning, legitimacy, and purpose. In advancing this framework, the present study makes a substantive theoretical contribution to AIED scholarship: it shifts the field's governing question from what can AI do in education? — a question that will always yield expanding answers — to the more consequential and enduring question of what AI can never be in education, and why that distinction matters not merely technologically, but humanly, ethically, and philosophically.

Algorithmic Simulation versus Genuine Empathic Resonance

Much contemporary AIED research treats AI-produced “empathic” outputs as if they were substantively equivalent to human empathy, a conceptual slippage so familiar it often goes unnoticed. Studies such as Jamaluddin and Mokhtar’s account of AI as a tool for empathy development, or Masih’s (2026) finding that empathetic systems can increase trust and inclusivity, rest on an implicit behaviourist premise: that empathy is simply the accurate reading of another’s emotional state and the production of an appropriate response. This is not just an oversimplification; it is a category error with serious consequences for how the field understands the boundary between simulation and genuinely human presence.

Drawing on phenomenology, particularly Husserl and Merleau-Ponty, this study starts from a different point: empathy is not primarily something performed, but something undergone. Merleau-Ponty’s notion of intercorporeal resonance names the pre-reflective, bodily sense that another conscious being is truly there with you — that your inner life has been met, not merely processed, by

someone who shares your vulnerable condition of being alive in the world. Empathy in this sense is a mode of being-with: an encounter in which two subjects are mutually affected in ways neither can fully predict or control. It presupposes a being who can be genuinely moved, altered by another's suffering, confusion, or joy. An AI system, however sophisticated, does not encounter the student; it executes a design, processing inputs and optimizing outputs within parameters set by others. What it produces is not "lesser empathy," but a simulation that mimics the surface structure of empathic response while lacking its ontological substance—a conclusion underscored by Masih's description of "superficial applications of empathy" in current systems.

In educational settings, students do not only benefit from empathic language; they benefit from knowing, however tacitly, that they are being seen by someone who could have withheld attention but chose not to. This moral dimension of empathic presence—grounded in freedom, vulnerability, and accountability—is structurally unavailable to AI. The field's failure to theorize this limit is therefore not just an intellectual omission but an ethical evasion. Confronting it is an epistemological and moral imperative for AIEd, not as a gesture of technophobia, but as an act of fidelity to what education, at its deepest, is meant to be.

What remains beyond technology and skill: Emotional Intelligence a non-negotiable, non-measurable relational practice

Debates about whether AI can develop or replicate emotional intelligence are now central to AIEd, yet the terms of this debate are rarely interrogated. Emotional intelligence is typically framed, following Mayer, Salovey, and Goleman, as a set of competencies—the ability to perceive, use, understand, and regulate emotions—which quietly recasts it as an engineering problem: can these capacities be modelled with enough data and deployed at scale? On that view, AI that accurately detects affect and produces fitting responses appears to approximate "emotional intelligence." But this framing misdescribes what makes emotional intelligence educationally significant. Drawing on Aristotelian virtue ethics and Noddings' ethics of care, the present study argues that emotional intelligence is not a transferable skill but a moral orientation cultivated over time in relationships sustained by attention, commitment, and responsibility to another person. Virtues, for Aristotle, are dispositions of character forged through practice in situations that carry real moral weight; they presuppose a subject capable of growth, failure, and accountability. None of this can be acquired by exposure to data or refined through optimization, because it does not describe a capacity separable from a moral agent.

From this perspective, emotional intelligence names the cultivated readiness to remain open to another's emotional reality, to be affected by it, and to respond not just appropriately but responsibly – to honor the other as a person rather than a case to be handled. A teacher who has developed this orientation with particular students in a particular context is not executing a function that AI might one day perform more efficiently; they are enacting a relational ethic inseparable from their own moral development and vulnerability. The implications for AIEd are direct: if emotional intelligence is a virtue rather than a skill, it cannot be delegated to systems incapable of moral development, relational continuity, or accountability. This is precisely the kind of normative-empirical conflation that Wieczorek et al. identify in the AI-and-education literature, and it is echoed in Masih's (2026) observation that "empathetic" AI operates within narrow ethical frames. Reframing emotional intelligence as a relational ethical practice rather than a measurable competency is not a terminological tweak; it reshapes how we judge the limits of machine pedagogical competence, how institutions design human-AI collaboration, and how teaching as a profession articulates what it cannot surrender without ceasing to be education in any humanly meaningful sense.

Beyond algorithms: Practical Wisdom as Education's Irreducible Core

Phronesis—Aristotle's notion of practical wisdom—is the capacity to discern what a particular situation demands and to act well in response, a form of judgment formed within the case itself rather than applied as a rule. Its resistance to codification is constitutive, not a temporary limitation that more data will solve: phronesis is oriented toward the singular, whereas AI, by design, operates on the generalizable. Teaching is built out of such judgments – when to push a student, when to pause, how to read a room, how to improvise ethically in real time—drawing on non-transferable, context-specific experience. It is, in practice, empathy and emotional intelligence translated into action. AI's role, on this view, should be reframed as support for routine and analytic tasks, not a substitute for this irreducible practical wisdom.

Across the corpus reviewed, human teachers are repeatedly described as exercising a form of judgment that is holistically contextual: integrating domain knowledge, relational sensitivity, and situational awareness in ways no algorithmic rule set can fully specify in advance. Wiese et al. capture this in their Content, Assessment, and Pedagogy framework; Wieczorek et al. show how AI systems repeatedly fail when confronted with the cultural, institutional, and contextual particularity that effective teaching demands; and Cao (2024) notes that AI introduces a mode of knowing—computational, statistical, context-

independent—that may challenge but cannot replace what is most humanly significant in teaching. What these accounts describe with considerable analytic force, but without a stable theoretical name, is precisely *phronesis*. Making that identification explicit is not a cosmetic move; it clarifies, at the level of principle rather than technical limitation, why contextual pedagogical judgment resists algorithmic substitution.

Aristotle's distinction between *phronesis*, *episteme* (theoretical knowledge), and *techne* (technical skill) is crucial here. *Phronesis* is the form of reasoning that deals with acting well in particular, morally complex, contextually embedded situations—not by applying universal rules, but by perceiving what this singular situation genuinely requires when no principle is sufficient. It is cultivated through lived experience and sustained moral engagement; it cannot be acquired through data accumulation or model refinement because it addresses the morally weighted singular rather than the statistically probable general. A teacher exercising *phronetic* judgment is not executing a pedagogical protocol, but perceiving this student in this unrepeatable moment and responding in a way that honours that uniqueness. The “learner” that AI models is always already a generalisation; the student whom *phronesis* addresses is always already particular. This is not a gap in AI's training data, but a categorical difference in the kind of knowledge at stake.

This distinction matters because it provides the field with what it currently lacks: a philosophically robust explanation of why teacher judgment cannot simply be replaced, one that moves beyond vague appeals to “human qualities” or “soft skills.” The pressing question is not whether AI can generate increasingly context-sensitive responses—it can, and will—but whether the knowledge instantiated in those responses is of the same kind as the knowledge genuine pedagogical judgment requires. It is not, and cannot be, because *phronesis* is not a more advanced form of pattern recognition; it is an entirely different epistemic orientation. As Wieczorek et al. note, AIED ethics discourse too often assumes that better contextual responsiveness from AI equals progress toward the kind of judgment teaching requires, without asking whether human judgment and AI responsiveness even belong on the same epistemic continuum. This study argues that they do not, and that *phronesis* provides precisely the theoretical vocabulary needed to make that case with the philosophical clarity and authority that contemporary debates about AI in education demand.

Delegated Casuistry: What Algorithmic Empathy Leaves Out in Education

The progressive delegation of care-related functions to AI exposes an ethical problem the literature has not theorized with sufficient precision: the conflation

of care as a service with care as a moral practice. When Jamaluddin and Mokhtar present AI as a support for empathy development, or Kong et al. frame AI-driven personalization as a way to meet diverse learner needs, caring and servicing are treated as functionally equivalent—as if contextually appropriate emotional support, whoever or whatever provides it, automatically counts as genuine care. This assumption obscures the moral architecture that makes care educationally meaningful and quietly normalizes arrangements whose ethical stakes remain underexamined.

For Noddings and Tronto, care is not an optimizable service but a relational commitment undertaken by a subject genuinely vulnerable to the other's condition, one who assumes real moral responsibility and can be held accountable for how that responsibility is honoured or betrayed. An AI system that delivers tailored emotional responses has not entered such a relationship; it has executed a design. It has not chosen to attend; it has been programmed to respond. In that sense, the student has been serviced, not cared for. This distinction reaches directly into the nature of trust. Trust in education is not built on the reliable provision of adequate responses alone, but on the recognition that another being—capable of indifference—has nonetheless chosen, repeatedly and at some cost, to remain present and responsible. That is a moral achievement that presupposes moral freedom and is structurally unavailable to systems that cannot choose otherwise.

The ethical stakes become most visible when AI systems misread students, overlook distress, or reproduce cultural bias under the guise of neutral personalization. In such cases, moral responsibility disperses across teachers, institutions, developers, and policymakers in ways that leave no one clearly answerable and no student fully protected. Wieczorek et al.'s emphasis on surveillance and data ethics points to this condition: systems that appear to care while remaining morally unaccountable do not approximate care—they displace the very conditions under which genuine care is possible. Algorithmic empathy, from this perspective, is not a benign technical proxy for human concern but a potentially corrosive substitution that educational scholarship has an urgent responsibility to name, theorize, and resist.

Algorithmic Governmentality and the Loss of Critical Subjectivity in AI-Mediated Education

A pervasive but underexamined assumption in AIEd is that AI functions as a neutral tool—enhancing learning outcomes without fundamentally reshaping the learners themselves. The evidence synthesized in this review suggests the opposite: through continuous, often invisible cycles of feedback, surveillance, and optimization, AI systems actively participate in forming students as particular kinds of thinkers, learners, and moral subjects. Drawing on Foucault, this can be read as a form of governmentality: power exercised not through overt coercion, but by configuring environments so that certain behaviours and

dispositions become automatic, unremarked, and difficult to resist. When educational AI relentlessly measures, ranks, predicts, and rewards performance against algorithmically defined standards, it does not simply evaluate existing subjectivities; it helps constitute new ones. The result is an efficiency-oriented subjectivity, in which students learn to optimize for speed, correctness, and measurable progress, while productive confusion, risk-taking, and the slower work of deep understanding are tacitly penalized.

This dynamic is sharpened when viewed through the lens of algorithmic governmentality: adaptive systems that claim to “meet learners where they are” simultaneously construct who those learners are, what they are presumed capable of, and what success can legitimately mean for them, on the basis of data patterns saturated with social and institutional bias. Wieczorek et al. show that such systems frequently reproduce normative assumptions that do not transfer across cultural and socioeconomic contexts; what passes as personalization often functions as differentiation that intensifies existing inequalities, routing differently positioned students along divergent, pre-structured pathways. Actor-Network Theory (Latour) underscores that AI is not a neutral conduit but an actant that reconfigures the entire educational network, redistributing agency, authority, and possibility in ways that warrant ethical, not merely technical, analysis.

What is ultimately at stake is whether education’s fundamental commitments—to critical consciousness, human flourishing, and the formation of subjects capable of questioning the conditions of their own production—are compatible with the logic of algorithmic optimization. From Dewey’s democratic experimentalism to Freire’s pedagogy of the oppressed, education is conceived as the practice through which people learn to interrogate and resist the systems that would otherwise define them without consent. An environment governed by algorithmic feedback that rewards efficiency, punishes ambiguity, and privileges the measurable over the meaningful does not simply fall short of this ideal; in important respects, it structurally negates it. The neutrality assumption is therefore not only analytically false but ethically dangerous: by refusing to interrogate how AI helps produce compliant, efficiency-oriented subjects, the field abdicates a core critical responsibility that educational scholarship is obligated to discharge.

Policy and Practice

The policy implications that emerge from this analysis are clear, substantial and urgent for contemporary educational governance. Educational institutions must establish stringent boundaries regarding AI involvement, particularly in areas such as relational care, evaluation, discipline, counseling, and high-stakes guidance. The existing body of research consistently demonstrates that transparency, accountability, and oversight are not merely optional technical features but ethical prerequisites for AI deployment in educational settings.

Wieczorek et al. contend that current regulations and guidelines are incomplete, stakeholder participation is uneven, and for-profit entities often shape educational AI based on commercial rather than pedagogical priorities. Similarly, Wiese et al. emphasize that AI ethics education should extend beyond technical literacy to encompass sociotechnical judgment, ethics communication, and public responsibility. Consequently, educational governance should mandate human-in-the-loop decision-making in all contexts involving student welfare, assessment interpretation, or vulnerability detection. "Such safeguards are not only procedural requirements; they are conditions for protecting students' trust, dignity, and sense of being genuinely seen by a responsible human other in AI-mediated classrooms."

Concrete recommendations derived from these principles are as follows:

1. AI should be restricted to supportive functions, such as drafting, organizing, analytics, or low-stakes feedback, and never serve as the final arbiter of student need or worth.
2. Institutions should implement procurement standards that mandate data minimization, ensure explainability for educators, and prohibit opaque affective surveillance, especially in school environments.
3. Teacher training must incorporate the ethical interpretation of AI outputs, not solely operational use, enabling educators to critically contest machine claims rather than passively accept them.
4. Policymakers should explicitly safeguard human pedagogical domains: counseling, formative judgment, conflict mediation, moral discussion, and care-intensive feedback must remain under human authority.

These delineated boundaries do not impede innovation; rather, they establish the necessary conditions for educational innovation to remain genuinely educational rather than extractive.

Hidden Assumptions, Silences, and Unresolved Questions

Beneath the explicit findings of the reviewed literature lie several structuring assumptions that quietly delimit how AI-mediated empathy and relationality are conceptualized in education. Bringing these assumptions into view clarifies not only what the field has examined, but also the questions it has not yet learned to ask.

Firstly, much of the scholarship presupposes a Western, individualistic model of empathy and emotional intelligence, in which emotion is treated as an intra-personal state, legible primarily through verbal and para-verbal expression. This framing obscures collectivist, ritual, embodied, and non-verbal modes of empathic attunement that characterize many non-Western and Indigenous educational worlds. Jamaluddin and Mokhtar register concerns about cultural specificity without fully unpacking their implications, while Masih's

identification of algorithmic bias illustrates how such narrow models risk hard-coding colonial epistemologies into AI-driven pedagogies.

Secondly, the literature remains largely silent on informal, community-based, and Indigenous pedagogical traditions. Within Ubuntu-inspired African philosophies or Indigenous learning communities, for example, the question of what remains uniquely human in education is configured quite differently, as teacher, learner, and community are understood as relationally entangled rather than discretely positioned roles.

Thirdly, and most critically, the student's perspective is under-theorized. Analyses of empathy, care, and teacher-student relationality are written from teacher or researcher standpoints, leaving comparatively unexplored how students themselves distinguish genuine from simulated care, or how they experience authenticity, trust, and presence in human versus AI-mediated interactions. These silences point to an unresolved research agenda: cross-cultural, student-centred, and community-rooted inquiries capable of contesting the field's implicit assumptions about empathy, subjectivity, and relational life under conditions of expanding AI mediation

LIMITATIONS AND FUTURE DIRECTIONS

These limitations concern both the scope of the bounded corpus and the interpretive nature of the claims advanced in this review. The study is intentionally conceptual and interpretive, drawing on a bounded corpus of twenty-five documents on AI in education, empathy, and the human dimensions of pedagogy. While this design enables depth of analysis, it also limits the extent to which the findings can be generalized beyond the reviewed literature.

Methodologically, the review relies on published, predominantly conceptual, review-based, or intervention-specific sources. This constrains the ability to draw causal inferences about long-term classroom outcomes, student well-being, or moral development. The bounded-corpus strategy, though coherent with the study's aims, also introduces selection and language bias and may underrepresent emergent practices in non-indexed or practitioner-oriented venues. Contextually and geographically, the underlying literature is skewed toward formal institutional settings in Global North contexts, with comparatively little engagement with Indigenous, community-based, or non-Western educational traditions. In addition, the review analyzes scholarly constructions of the human residue of education rather than observing classroom practice directly, so its claims should be read as theoretically grounded hypotheses rather than empirically universal laws.

Future research should extend this work through longitudinal, multi-site, mixed-methods studies examining how AI reshapes relational practice, teacher judgment, and student experience over time in real classrooms. Ethnographic and student-centred qualitative research could foreground learner perspectives on authenticity, trust, and care in human versus AI interactions, while

comparative cross-cultural studies could test and refine the HER dimensions in non-Western and Indigenous contexts. Critical posthumanist and Foucauldian analyses may further examine how AI mediates subject formation, disciplinary power, and algorithmic governmentality in education. Interdisciplinary collaboration with policy studies and learning sciences could also clarify how governance and accountability structures might prevent the diffusion of moral responsibility in AI-mediated environments.

Despite these limitations, the present study offers a necessary theoretical reorientation: it clarifies what remains irreducibly human in education and provides a conceptual foundation for future empirical, cross-contextual, and policy-relevant research.

Integrated Analytical Lens

The question of what remains irreducibly human in AI-mediated education cannot be answered by technical metrics or a single theory; it demands a lens that brings together relational ethics, socio-developmental processes, and the epistemic limits of computation. This study therefore integrates three primary frameworks—care ethics, Vygotskian sociocultural theory, and a critique of algorithmic reductionism—complemented by virtue-ethical accounts of phronesis and critical work on AI ethics in education. Care ethics (Noddings, Tronto) frames pedagogy as accountable, asymmetrical relational commitment rather than an affective performance that can be scripted on demand. Sociocultural theory conceives learning as co-constructed within historically and socially mediated activity, emphasizing tools, joint meaning-making, and the zone of proximal development over individualized performance optimization. Anti-reductionist critique treats datafication itself as a normative act, challenging the assumption that educational experience can be fully captured through behavioural traces, affect labels, or computational proxies.

These perspectives function not as parallel add-ons but as a single analytical stance on the human–AI boundary: care ethics grounds the claim that genuine pedagogy requires moral vulnerability, answerability, and sustained presence; sociocultural theory specifies how such relations are constitutive of learning; and the critique of reductionism marks the point at which attempts to encode these dynamics inevitably omit what they purport to represent. Together, they clarify what AI can usefully assist (e.g. feedback, organisation), what it can only simulate (e.g. empathic language), and what it cannot ontologically possess—ontological presence, phronetic judgment, relational ethics, and cultural-affective attunement, later formalized in the Human Educational Residual framework. Analytically, this integrated lens directs coding, theme construction, and interpretation by asking of each text how it positions AI in relation to care, socially mediated learning, and the preservation or erosion of educational complexity, ensuring that the synthesis foregrounds moral, developmental, and epistemic stakes rather than merely technical capacities.

What the Literature Collectively Reveals

Taken together, the corpus shows that the spread of AI in education does not dissolve the human core of teaching; it throws it into sharper relief. Whenever AI is imagined as a replacement rather than a support, the arguments repeatedly stall at the same boundary: forms of presence, judgment, and responsibility that the literature – often implicitly – treats as beyond algorithmic reach. As artificial systems absorb more of the functional work of instruction, what cannot be automated, delegated, or scaled emerges not as a nostalgic remainder of pre-digital pedagogy, but as the moral and ontological condition that gives any educational arrangement, including AI-mediated ones, its specifically human meaning.

CONCLUSION

At the heart of this study is a simple but unsettling claim: no matter how powerful educational AI becomes, it cannot cross the boundary that makes education a distinctly human practice. The Human Educational Residual (HER) framework names that boundary in concrete terms—ontological presence, phronetic judgment, relational ethics, and cultural-affective attunement—and shows that these are not optional “soft skills” that await better automation, but the very ground on which meaningful learning stands. On this account, AI can support and reorganize aspects of educational practice, yet it cannot bear the moral vulnerability, context-sensitive wisdom, and accountable care that make teachers genuinely answerable for what happens to their students. What is therefore at stake is not the usefulness of AI, which is considerable, but the field’s willingness to distinguish clearly between what AI may legitimately assist and what must remain irreducibly human. Treating AI-generated feedback, affective responses, or personalized pathways as equivalent to human teaching is not a minor simplification; it confuses simulation with presence and risks restructuring education around efficiency, prediction, and control rather than critical inquiry and moral growth. Read through Foucault’s notion of governmentality, algorithmic systems do more than optimize learning processes: they participate in producing particular kinds of subjects, normalizing dispositions that fit algorithmic standards while sidelining slower, resistant, or disruptive forms of thought that genuine education should cultivate. Insisting on the HER dimensions is thus not an exercise in technophobia, but a forward-looking ethical claim. If education is to remain a space where learners can question, rather than merely adapt to, the systems that shape them, human teachers—and the kinds of responsibility, judgment, and care that only they can exercise—must stay at the core of educational life.

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