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Algorithmic Authority and the Ethical Turn in Educational Technology: A Praxis-Oriented Approach

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Abstract

In recent years, educational technologies—ranging from algorithmic learning platforms and AI-powered assessment tools to predictive analytics—have emerged as central to educational environments. While these systems promise efficiency, objectivity, and scalability, they also carry profound epistemic, ethical, and political risks regarding what counts as valuable knowledge, how decisions are made, and how the subject is positioned in the learning process. This article examines the rise of algorithmic authority in education and the challenges it brings, including issues of transparency, accountability, and epistemic injustice. It also investigates the impact of algorithmic governance on pedagogical relationships, professional agency, and democratic accountability. The article argues that procedural ethics or human oversight alone is insufficient; instead, it advances a praxis-oriented design approach. This perspective frames educational technologies not as neutral tools but as moral and pedagogical infrastructures, placing human dignity, relational care, and the pursuit of justice at the center of design and implementation. Principles of participatory and relational design, alongside the preparation of teachers as ethical agents, are identified as key to shaping a more just, transparent, and humane future for digital pedagogy.

Keywords

Educational technology,
Algorithmic authority,
Ethical turn,
Epistemic justice,
Participatory design,
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1. Introduction

The first quarter of the twenty-first century has witnessed the unprecedented expansion of educational technologies—from algorithmic learning platforms and AI-powered assessment tools to data dashboards and predictive analytics used in school management. These systems promise greater efficiency, personalization, and objectivity—promises that have accelerated their integration into classrooms, administrative decision-making, and educational policy. Yet beneath these promises lies a growing unease: What values are embedded in these technologies? Who designs them, and for whom? And as algorithms mediate the conditions of teaching and learning, how are power and responsibility being redistributed?

Although educational technology is often presented as a neutral tool, it is in fact a deeply value-laden infrastructure. Algorithms do more than process data—they shape how educational success is defined, how students are categorized, and which pedagogical strategies are prioritized or excluded (Williamson, 2017). The rise of what some scholars describe as algorithmic governance thus signals not only a technical shift, but also a profound epistemological and political transformation in how education is practiced and understood (Beer, 2018).

In this context, calls for an ethical turn in educational technology are increasingly resonant. Such a turn is not simply about retroactively applying ethical principles, but about rethinking the design, use, and evaluation of educational technologies from the outset. This requires critically interrogating algorithmic authority—the perception that machine-generated decisions in educational settings are legitimate. Such authority can obscure human judgment, flatten pedagogical complexity, and reinforce existing inequalities (Introna & Nissenbaum, 2000).

This article explores the philosophical and educational dimensions of this ethical turn. Drawing on critical theory, epistemic justice, and design ethics, we argue that reclaiming human subjectivity and ethical reasoning in educational technology is not a matter of preference but of necessity. The task is not only to critique algorithmic systems, but to envision alternative futures in which technology serves participatory, justice-oriented, and pedagogically meaningful purposes.

2. Understanding Algorithmic Authority in Education

As algorithms increasingly shape educational processes—from student assessment to behavioral monitoring, and from institutional decision-making to curriculum pathways—their role has shifted from providing technical support to exercising a form of decision-making power. This shift has given rise to what scholars call algorithmic authority: the phenomenon whereby algorithmic outputs are no longer treated merely as informative data, but as legitimate, trustworthy, and even final decisions (Gillespie, 2014; Introna & Nissenbaum, 2000). In such systems, predictions generated by machine learning models are often accepted not as probabilistic judgments but as neutral facts. This marks a profound epistemological transformation: a move from human judgment, grounded in context and interpretation, to computational inference based on data correlations.

In educational settings, this authority is rarely questioned. Automated systems evaluate essays, recommend interventions, classify students, and in some cases even guide curricular trajectories. The decisions—or more precisely, the predictions—produced by these systems are frequently difficult to interpret, opaque in their reasoning, and accepted as objective by virtue of their algorithmic origins (O'Neil, 2016). Yet this assumption obscures a host of ethical and pedagogical concerns: Which forms of knowledge are privileged? Who holds the power to design these systems and to contest their outputs? And how do algorithmic judgments reshape pedagogical relationships and professional autonomy?

This section examines the emergence and implications of algorithmic authority in education. It begins by defining the concept and discussing how algorithmic systems have begun to replace or complement human judgment. It then analyzes the shift from qualitative interpretation to quantitative prediction, offering examples of how algorithmic authority operates in both pedagogical and administrative contexts. Finally, it addresses unresolved issues such as transparency, explainability, and accountability—critical concerns that carry significant ethical weight in educational environments.

2.1 What Is Algorithmic Authority?

The term algorithmic authority refers to the growing reliance on algorithmic systems as legitimate sources of knowledge, decision-making, and control. As Gillespie (2014) explains, algorithmic authority emerges when outputs generated through computational processes are perceived not merely as suggestions but as authoritative judgments—judgments that gain trust because of their apparent objectivity, scalability, and technical sophistication. This perception grants algorithms a quasi-institutional status, allowing them to shape behavior, categorize individuals, and structure opportunities without direct human intervention.

Initially conceptualized in the context of search engines and recommendation systems, algorithmic authority has since spread to fields such as finance, healthcare, law, and education. What distinguishes algorithmic authority from traditional forms of authority is its opacity: the logic behind decisions is often unintelligible, embedded in complex machine-learning models, proprietary software code, or constantly shifting training data (Pasquale, 2015). As a result, users are encouraged to trust the system even without fully understanding its operations; as Introna and Nissenbaum (2000) describe, this dynamic constitutes a form of "delegated agency without accountability."

In education, algorithmic authority manifests when systems are tasked with evaluating student performance, identifying "at-risk" individuals, or recommending learning pathways. These systems are often justified through claims of efficiency, scalability, or data-driven certainty. Yet such justifications obscure the normative assumptions embedded in algorithmic design—assumptions about what counts as learning, which behaviors are deemed desirable, and who is categorized as successful or as "deviant" (Williamson, 2017). Thus, algorithms function less as neutral tools than as moral and epistemic actors, shaping what is seen, valued, and acted upon in educational environments.

Crucially, algorithmic authority does not eliminate human judgment; it reconfigures it. Educators, administrators, and students may defer to algorithmic outputs not because they are compelled to, but because they have been conditioned to perceive such outputs as more reliable than subjective assessments. Over time, this deference can erode professional autonomy and critical judgment, leading to what Eubanks (2018) calls "automating inequality"—a systematic displacement of responsibility in which algorithmic decisions become naturalized, unquestionable, and resistant to contestation.

2.2 From Judgment to Prediction: An Epistemological Transformation

At the core of algorithmic authority lies a fundamental epistemological transformation: the replacement of human judgment with machine-based prediction. In traditional educational contexts, judgment involves an interpretive and situated decision-making process grounded in experience, ethical reasoning, and dialogical interaction. Teachers assess not only performance but also intention, context, and the emotional or relational dynamics of learning. By contrast, algorithmic systems operate on the logic of statistical inference, optimizing decisions based on patterns observed in historical data (Mackenzie, 2015). What is produced is not an

understanding of the learner, but a probabilistic classification of future behavior or performance.

This shift from judgment to prediction is often framed as a form of progress—eliminating bias, increasing efficiency, and scaling insight. Yet it simultaneously narrows what counts as legitimate knowledge in education. Algorithms require data that can be quantified, standardized, and codified. As a result, they privilege measurable inputs and outputs—such as test scores, click rates, and behavioral alerts—while sidelining the emotional, contextual, and relational dimensions that are central to pedagogical life (Williamson, 2017). In this way, prediction begins to displace meaning.

Moreover, predictive systems do not merely reflect the past; they actively shape the future. By labeling students as "high risk," steering them toward remedial learning tracks, or structuring their learning experiences through adaptive platforms, algorithms make decisions that carry material consequences. These decisions are often accepted as objective because they are generated computationally. Yet, as O'Neil (2016) and Eubanks (2018) point out, predictive models frequently rely on educational data that encode historical patterns of exclusion, bias, or underperformance—thereby tending to reproduce social inequalities.

Replacing pedagogical uncertainty with predictive certainty generates serious ethical risks. Education is inherently unpredictable, involving people, relationships, and the emergence of new meanings. Attempts to algorithmically "solve" this creative complexity substitute calculation for deliberation. This process undermines not only teachers' autonomy but also the learner's capacity to exceed expectations—the potential to surprise, to resist, and to grow in ways that data cannot foresee.

2.3 Algorithmic Systems in Pedagogical and Administrative Contexts

Algorithmic systems are increasingly embedded in the everyday functioning of schools, classrooms, and educational systems. Their influence extends from pedagogical design and student assessment to behavior management and institutional governance. What unites these diverse applications is their reliance on data-driven processes of classification and intervention—turning students into profiles, reducing actions to metrics, and translating complex decisions into automated outputs.

In the classroom, adaptive learning platforms and learning management systems (LMS) monitor student interactions to personalize the delivery of content. These systems claim to optimize learning by adjusting pathways in real time based on performance data. Yet they also

impose predefined trajectories, constrain open-ended inquiry, and construct "learner models" that reduce students to behavioral signatures (Bulger, 2016). Algorithmic mediation thus shapes not only what students learn, but also how they are perceived by the system.

In the domain of assessment, algorithms are used to grade written assignments, detect anomalies in test-taking behavior, and measure student engagement through biometric or clickstream data. For example, automated essay scoring tools can analyze grammar and structural features but cannot recognize originality, voice, or context-specific meaning (Perelman, 2013). Such systems reduce assessment to pattern recognition, privileging surface features over depth and quantitative measurability over interpretive judgment.

At the administrative level, algorithmic tools support decision-making related to resource allocation, dropout prediction, disciplinary interventions, and even teacher evaluation. Predictive analytics models identify "at-risk" students based on past indicators such as absenteeism, grades, and disciplinary records, and propose interventions accordingly. While these tools promise early detection and efficiency, they also risk stigmatizing students, reinforcing deficit-oriented narratives, and institutionalizing a logic of surveillance (Eubanks, 2018; O'Neil, 2016).

Moreover, the integration of algorithmic systems often occurs without meaningful transparency. Proprietary algorithms, vendor contracts, and black-box architectures make it difficult—if not impossible—for educators, students, or parents to understand how decisions are made, let alone to contest them. This lack of interpretability weakens accountability and challenges the democratic ideals of public education. As Boyd and Crawford (2012) remind us, "data are not neutral"—they reflect the assumptions, intentions, and power structures of those who collect and deploy them.

In sum, algorithmic systems are not peripheral tools; they are becoming infrastructural logics that shape educational practices at multiple levels. Their authority is established not only through computation but also through institutional acceptance, policy endorsement, and cultural normalization.

2.4 Issues of Transparency, Explainability, and Accountability

The widespread adoption of algorithmic systems in education brings with it three interrelated ethical challenges: transparency, explainability, and accountability. Together, these concepts

frame the central dilemma of algorithmic governance: how can we safeguard trust and fairness in systems that are often opaque, complex, and resistant to scrutiny?

Transparency refers to the visibility of how algorithmic decisions are made. Yet many educational technologies are developed by private companies that invoke intellectual property rights to protect their designs. As a result, teachers, students, and administrators are compelled to trust the outputs of "black-box" systems whose inner workings remain hidden (Pasquale, 2015). This lack of transparency weakens informed consent, limits critical engagement, and creates a power asymmetry between system designers and users.

Explainability goes beyond visibility, questioning whether algorithmic decisions can be rendered understandable in human terms. In machine learning, technical explainability (e.g., interpretable models, local feature attributions) is an active area of research. However, pedagogical contexts require not only mathematical clarity but also moral and contextual comprehensibility (Selbst et al., 2019). For example, when a student is flagged as "at risk" or denied access to advanced courses, educators must be able to explain not only how the algorithm arrived at that conclusion, but also whether such a judgment is educationally legitimate.

Accountability asks who is responsible for the outcomes of algorithmic systems. In current practice, accountability is often diffuse—designers blame users for misuse, users fault the system for its opacity, and institutions invoke "data" as if it were a neutral arbiter. This dynamic of responsibility-shifting obscures the moral subjectivity inherent in both the design and deployment of such systems. Mittelstadt et al. (2016) argue that ethical accountability in algorithmic systems requires clear allocation of responsibility throughout the entire cycle of data collection, model development, implementation, and intervention.

Without robust mechanisms for transparency, explainability, and accountability, algorithmic systems risk operating beyond the reach of democratic oversight. In education—understood as a public good grounded in care, justice, and relational meaning—this is particularly dangerous. Ethical engagement with educational technologies must therefore begin with structural commitments to openness, interpretability, and moral responsibility.

3. Epistemic and Political Risks of Algorithmic Systems

Although algorithmic systems in education are frequently justified through claims of efficiency, objectivity, and scalability, their use raises significant epistemic and political concerns. These concerns arise not only from the technical limitations of algorithms, but also from the ways

they redefine what counts as legitimate knowledge, whose voices are amplified or silenced, and how authority is enacted within educational spaces. In other words, algorithms do not merely rank data; they rank people, values, and futures.

From an epistemological perspective, algorithmic systems privilege forms of knowledge that are quantifiable, orderly, and historically documented, while marginalizing other forms such as narrative understanding, tacit expertise, or culturally situated insight (Fricker, 2007; boyd & Crawford, 2012). This creates conditions of epistemic injustice, whereby certain individuals or groups are systematically excluded from processes of knowledge production, validation, and application.

Politically, algorithmic systems function as decision-making mechanisms embedded within technological infrastructures that often appear neutral but in fact encode particular interests, assumptions, and exclusions (Williamson, 2017). By classifying students, prioritizing behaviors, or allocating resources, these systems shape educational trajectories without the transparency and contestability that democratic deliberation requires. Moreover, when adopted without sufficient oversight, they risk reinforcing existing inequalities under the guise of innovation.

This section examines these epistemic and political risks in detail. First, it considers how algorithmic systems encode assumptions and exclusions. Second, it analyzes how the process of datafication reshapes power dynamics in education. Finally, it asks how philosophy of education can render visible—and resist—the silent normalization of algorithmic governance in schools.

3.1 Epistemic Injustice and the Politics of Data

In education, algorithms do not merely process neutral information; they actively shape what is counted as valid knowledge, whose voices are heard, and which perspectives are included in decision-making. Miranda Fricker's (2007) concept of epistemic injustice refers to the harm individuals suffer specifically in their capacity as knowers. In the context of algorithmic systems, such injustice occurs when students, teachers, or communities are excluded from the systems that evaluate them, when their lived experiences are reduced to abstract variables, or when they cannot contest algorithmic classifications that influence their educational trajectories.

Two forms of epistemic injustice are particularly relevant here. Testimonial injustice arises when someone's voice is systematically accorded less credibility because of their social identity or perceived reliability. For instance, when a student's own account of their performance is dismissed in favor of algorithmic indicators, or when a teacher's professional judgment is overridden by predictive risk scores, testimonial injustice takes root. Hermeneutical injustice, by contrast, occurs when individuals lack the conceptual resources to make sense of their experiences—when the system provides no space for their perspective. In algorithmic contexts, this manifests in opaque decision-making processes, black-box models, and the absence of participatory design in educational technologies (Burrell, 2016; Pasquale, 2015).

The politics of data intensifies these injustices. Educational platforms often collect data without meaningful consent, classify behaviors through pre-established categories, and interpret actions according to norms defined outside the learner's context. As boyd and Crawford (2012) observe, "data are not given; they are taken." The transformation of behavior, thought, and emotion into digital traces—what is often called datafication—imposes a logic of surveillance, standardization, and abstraction that tends to erase difference, uncertainty, and resistance.

Moreover, these systems are often least accountable to those most affected by them. Students marginalized by race, language, disability, or socioeconomic status are subject to heightened surveillance, misclassification, or being flagged as "at risk"—not because of neutral behaviors, but due to historically biased datasets and institutional assumptions (Eubanks, 2018). In this way, algorithmic systems risk reproducing the very structural inequalities they claim to mitigate.

Addressing epistemic injustice in educational technology requires rethinking ethical design not merely as a technical issue but as a relational, political, and philosophical one. This entails reimagining data practices, opening systems to critique, and restoring space for human judgment, dialogue, and contestation in educational decision-making.

3.2 Governance by Code: Algorithmic Power in Education

As algorithmic systems become embedded in educational infrastructures, they function not only as tools for managing data but also as mechanisms of governance. Often described as governance by code, this phenomenon refers to the ways technical systems operationalize norms, distribute authority, and shape behavior beyond traditional processes of deliberation (Williamson, 2017; Kitchin, 2017). In this model, governance occurs not through laws, policies,

or human judgment, but through protocols, defaults, and invisible thresholds inscribed into algorithmic design.

In education, such governance manifests in subtle yet powerful ways. Risk prediction models determine which students receive interventions, are directed toward remedial courses, or face disciplinary measures. Automated recommendation systems influence which content students engage with, which learning pathways they follow, and how success is defined. Even seemingly innocuous data dashboards create performative expectations about what matters in learning by prioritizing certain metrics—such as time on task, click rates, or test completion. Over time, these systems establish normative frameworks that, often without users' awareness, reshape pedagogical priorities and institutional practices.

What distinguishes this form of power is its invisibility and automaticity. Unlike traditional authority, algorithmic governance operates silently and pervasively. It encodes values through technical design rather than explicit reasoning, thereby enforcing particular visions of learning, risk, and value while maintaining an appearance of neutrality (Beer, 2018). In this sense, code becomes a form of soft coercion—shaping behavior not through commands but through affordances, constraints, and feedback loops.

Moreover, algorithmic power is frequently asymmetrical. Agency is concentrated in the hands of system designers, developers, and providers, while accountability is diffused away from them. This asymmetry is exacerbated by the commercialization of the EdTech ecosystem, where decision-making authority shifts from public institutions to private platforms whose interests may not align with educational equity or democratic participation (Perrotta et al., 2020). The result is a quiet reconfiguration of educational governance away from teachers, communities, and ethical deliberation, and toward data-driven abstraction and remote control.

Resisting algorithmic power in education cannot be achieved through technical oversight alone; it also requires philosophical clarity about the kinds of agency, justice, and relationships we want educational systems to cultivate. The task for philosophers of education is not only to interrogate what code does, but also to question what it normalizes and what it renders impossible.

4. Toward an Ethical Turn in Educational Technology

Amid growing concerns about opacity, epistemic injustice, and algorithmic governance, the need for an ethical turn in educational technology has become urgent. Such a turn requires more

than the superficial addition of ethical guidelines to technical systems; it calls for a deeper reorientation that places human dignity, relational care, and democratic accountability at the center of design, implementation, and evaluation. Educational technology should not be understood merely as a set of tools, but as a moral and pedagogical infrastructure that shapes how we know the world, how we relate to one another, and how we act within it (Selwyn, 2019).

An ethical approach must begin by rejecting the illusion of technological neutrality. As scholars across disciplines have emphasized, all technologies are political, insofar as they reflect and reproduce particular values, assumptions, and social orders (Winner, 1980; Feenberg, 1991). In the educational context, this means acknowledging that platform architectures, data models, and algorithmic pathways are not neutral; they embody specific visions of what learning is, how success is defined, and who is deemed to deserve intervention or exclusion. Ethical engagement, therefore, is not reducible to compliance with technical standards; it requires collective reflection on the purposes and consequences of technology in education.

This section outlines the key dimensions of an ethical turn in EdTech. First, it examines the human-in-the-loop approach to incorporating human oversight into technological processes and discusses why this remains limited in addressing issues of responsibility and subjectivity. Second, it introduces participatory and relational design frameworks that foreground inclusivity, transparency, and pedagogical sensitivity. Finally, it considers how ethical awareness can be cultivated through teacher education and critical digital literacy, enabling educators to become not passive implementers but active ethical agents in digital environments.

4.1 Human Oversight and the Limits of Procedural Ethics

One of the most common responses to ethical concerns in artificial intelligence and educational technology is the principle of human-in-the-loop—that is, ensuring that algorithmic decisions are reviewed, approved, or monitored by human actors. This model assumes that ethical failures can be prevented through human oversight, thereby combining the efficiency of automation with the moral dimension of human judgment. While intuitively appealing, this procedural approach has serious limitations, particularly in value-laden contexts such as education.

First, this model often overstates the qualifications and expertise of the human operator. In educational settings, teachers and administrators are confronted with algorithmic outputs (e.g., risk scores, predicted grades, behavioral alerts) without fully understanding how they are produced or what they signify. The “black box” problem of machine learning renders human

oversight frequently superficial, and at times even complicit (Burrell, 2016). Ethical responsibility becomes diffused: humans may remain in the loop, but control does not.

Second, procedural ethics tends to frame ethical decision-making primarily as a matter of compliance—checking boxes, following guidelines, or minimizing individual harms. Such an approach neglects the structural and relational dimensions of how technologies shape subjectivity, authority, and the very possibilities of learning. In other words, it asks whether the system is functioning fairly, but rarely questions whether the system should exist in its current form at all (Selbst et al., 2019).

Finally, the human-in-the-loop model positions humans less as co-producers of meaning and more as corrective mechanisms. The underlying assumption is that the algorithm is essentially correct and should not be questioned unless proven otherwise. This reverses the burden of proof and risks marginalizing pedagogical judgment, emotional intuition, and context-sensitive interpretation—the very elements that are central to ethical teaching.

In short, while human oversight is necessary, it is not sufficient. Ethics in educational technology cannot be reduced to additional layers of control or procedural checklists; it must be grounded in philosophical reflection on the purposes of education, the conditions of justice, and the flourishing of the human subject.

4.2 Participatory and Relational Design in Education

Moving beyond procedural ethics requires rethinking the design of educational technologies not only in terms of functionality and performance, but also in terms of who participates in the process, which values are embedded, and how relational dimensions are preserved. Participatory and relational design frameworks offer a promising way forward. These approaches recognize that educational technologies are never value-free, and that their ethical integrity depends on how they are designed, constructed, and used within human communities.

Participatory design emerged in the 1970s out of Scandinavian democratic traditions, emphasizing the inclusion of workers and marginalized voices in technology design (Bannon & Ehn, 2013). In educational contexts, this means involving teachers, students, families, and communities in the development and implementation of EdTech systems. Design is carried out with users, not for them, so that systems are co-constructed to reflect the needs, experiences, and aspirations of diverse educational actors.

This orientation challenges vendor-driven, top-down models of innovation that impose technologies without engaging pedagogical realities. It also resists the logic of personalization that tends to reduce learners to data profiles rather than recognizing them as complex subjects. Participatory ethics values negotiation, experimentation, and contextual uniqueness over scalability and generalizability.

Relational design, meanwhile, places the quality of educational relationships at its center. Drawing on the ethics of care and dialogical pedagogy, this approach asks how technologies mediate connections between teacher and student, learner and content, school and community (Held, 2006; Noddings, 2013). From this perspective, an ethically sound EdTech system is not one that maximizes efficiency or standardizes interaction, but one that strengthens empathy, recognition, and trust.

Together, these design philosophies shift the focus from system outputs to human well-being. They invite us to ask not only "What works?" but also "What matters?" and "For whom?" By embedding design within ethical and pedagogical relationships, participatory and relational approaches reframe educational technology not as market-driven innovation, but as a shared moral endeavor.

4.3 Ethical Literacy and the Role of Teacher Education

For educational technologies to support just and humane learning environments, teachers must be equipped with a parallel transformation in how they engage with these technologies. Ethical design alone is insufficient; ethical literacy is equally essential. This is not simply familiarity with ethical codes or frameworks, but the cultivation of critical capacities that enable teachers to interpret, question, and, when necessary, intervene in the technological systems that shape their pedagogical practice.

In this sense, teacher education must move beyond training in digital skills. It must nurture reflective dispositions, dialogical awareness, and moral imagination—preparing teachers to navigate value conflicts embedded in data-driven environments (Kerr, 2006). For example, teachers should be able to recognize when predictive analytics reinforce stereotypes, when algorithmic feedback undermines student autonomy, or when platform metrics distort genuine learning goals.

Ethical literacy also entails questioning the hidden curriculum of EdTech—the values and behaviors indirectly promoted by technological systems. Without critical preparation, teachers may adopt tools that privilege surveillance, compliance, or quantification under the assumption

that they are neutral or beneficial. Ethical literacy empowers teachers to ask fundamental questions: Whose interests does this tool serve? Which pedagogical relationships does it enable or constrain? How does it frame learning itself?

Crucially, ethical literacy should not be treated as an individual trait but as a relational and institutional practice. It must be embedded in teacher education programs, ongoing professional development, and collaborative school cultures. Philosophical inquiry, case-based reasoning, and participatory technology assessment can all serve as pathways for fostering ethical judgment. As Biesta (2020) reminds us, the task of education is not to adapt to technological affordances, but to defend and enact educational values in their presence.

When teachers are positioned as ethical agents—not passive implementers of systems but thoughtful custodians of educational meaning—they become central actors in resisting harmful forms of digital governance and in collectively constructing more just educational futures.

5. Praxis-Oriented Design and the Future of Digital Pedagogy

An ethical reimagining of educational technology cannot remain limited to critique; it requires the constructive development of pedagogical frameworks that integrate philosophical reflection with transformative action. This vision resonates with the concept of praxis—a form of human activity that unites critical thought with socially situated engagement (Freire, 2005). In the context of EdTech, praxis-oriented design challenges the prevailing logics of instrumental efficiency and abstract formalism, offering instead a relational, justice-oriented, and dialogical approach to shaping the digital future of education.

At the heart of praxis-oriented design is a rejection of the dominant emphasis on control and predictability in current algorithmic systems. Rather than treating education as a problem to be optimized, it approaches it as a complex and value-laden encounter in which uncertainty, ambiguity, and resistance are not obstacles but essential conditions for growth. Technologies developed within a praxis framework are not designed to enforce compliance, classification, or behavioral steering; their aim is to enable ethical reasoning, critical inquiry, and collective meaning-making.

This orientation requires interdisciplinary collaboration: philosophers, educators, technologists, and students must work together not only to ask “What can be done?” but also “What ought to be done?” It also implies a shift in design priorities—from personalization to participation, from automation to deliberation, from surveillance to care. For example, instead of using AI to

predict outcomes based on students' past behaviors, a praxis-oriented system might facilitate dialogue between teachers and students about learning goals, challenges, and values—thereby preserving the relational essence of pedagogy.

Furthermore, a digital pedagogy informed by praxis acknowledges and cultivates the moral and political dimensions of teaching. It affirms the educator not as a data manager, but as a moral subject co-constructing educational meaning in real time. This translates into technologies that foreground teacher agency, support slow reflection over rapid metrics, and create ethical pauses within digital routines.

Finally, praxis-oriented design invites us to ask different questions. Not "What works best according to data?" but "What kinds of students and citizens are we cultivating?" Not "How do we guarantee participation?" but "How do we nurture responsibility, critique, and relational autonomy?" When we ask such questions, philosophy reclaims its role not as an afterthought to innovation, but as its ethical and imaginative foundation.

6. Conclusion

This article has argued that the rise of algorithmic systems in education entails not only technical and procedural challenges but also profound epistemic, ethical, and political risks. Far from being neutral tools, educational technologies actively shape what counts as valid knowledge, how decisions are made, and who is positioned as a subject in the learning process. The growing authority of algorithms therefore necessitates a deep ethical turn—one that resists abstraction, re-centers human judgment, and reimagines technology as a domain of relational and moral engagement.

We have seen how algorithmic authority transforms the nature of pedagogical judgment, displaces accountability, and entrenches forms of epistemic injustice. Attempts to address these issues through procedural ethics or human oversight are necessary but insufficient without a broader philosophical reorientation. What is required is a praxis-centered approach that integrates critical reflection with participatory action, and that treats educational technology not as an end in itself but as a means in the service of justice, care, and collective human flourishing.

A praxis-oriented vision of EdTech begins by asking ethical questions at the point of design: Who is included in the process? Which values are embedded? Which futures are enabled, and which are excluded? Such a vision insists on positioning educators not as passive users but as active ethical agents. It calls for interdisciplinary collaboration, democratic participation, and ongoing inquiry into what education ought to be in an age of digital mediation.

Reclaiming the role of philosophy in the design and use of educational technologies does not mean rejecting innovation. On the contrary, it reminds us that without ethical orientation and human purpose, innovation risks becoming empty: efficient but unjust, scalable but inhumane. A future of education worth building is one in which technology serves pedagogy, not the other way around. *For this, we must begin not with code, but with conscience.*

References

Bannon, L. J., & Ehn, P. (2013). Design: Design matters in participatory design. In J. Simonsen & T. Robertson (Eds.), *Routledge international handbook of participatory design* (pp. 37–63). Routledge.

Beer, D. (2018). *The data gaze: Capitalism, power and perception.* SAGE.

Biesta, G. (2020). *Educational research: An unorthodox introduction.* Bloomsbury.

boyd, d., & Crawford, K. (2012). Critical questions for big data. *Information, Communication & Society, 15*(5), 662–679. https://doi.org/10.1080/1369118X.2012.678878

Burrell, J. (2016). How the machine 'thinks': Understanding opacity in machine learning algorithms. *Big Data & Society, 3*(1), 1–12. https://doi.org/10.1177/2053951715622512

Eubanks, V. (2018). A*utomating inequality: How high-tech tools profile, police, and punish the poor.* St. Martin's Press.

Feenberg, A. (1991). *Critical theory of technology.* Oxford University Press.

Fricker, M. (2007). *Epistemic injustice: Power and the ethics of knowing*. Oxford University Press.

Freire, P. (2005). *Pedagogy of the oppressed* (30th anniversary ed., M. B. Ramos, Trans.). Continuum. (Original work published 1970)

Gillespie, T. (2014). The relevance of algorithms. In T. Gillespie, P. Boczkowski, & K. Foot (Eds.), *Media technologies: Essays on communication, materiality, and society* (pp. 167–194). MIT Press.

Held, V. (2006). *The ethics of care: Personal, political, and global.* Oxford University Press.

Introna, L. D., & Nissenbaum, H. (2000). Shaping the web: Why the politics of search engines matters. *The Information Society, 16*(3), 169–185.

Kerr, D. (2006). Citizenship education and teacher training: International perspectives. In C. Hahn (Ed.), *Doing citizenship education* (pp. 115–132). Teachers College Press.

Kitchin, R. (2017). Thinking critically about and researching algorithms. *Information, Communication & Society, 20*(1), 14–29. https://doi.org/10.1080/1369118X.2016.1154087

Mackenzie, A. (2015). The production of prediction: What does machine learning want? European *Journal of Cultural Studies, 18*(4–5), 429–445. https://doi.org/10.1177/1367549415577384

Mittelstadt, B. D., Allo, P., Taddeo, M., Wachter, S., & Floridi, L. (2016). The ethics of algorithms: Mapping the debate. *Big Data & Society, 3*(2), 1–21. https://doi.org/10.1177/2053951716679679

Noddings, N. (2013). *Caring: A relational approach to ethics and moral education (2nd ed.).* University of California Press.

O'Neil, C. (2016). *Weapons of math destruction: How big data increases inequality and threatens democracy.* Crown Publishing.

Pasquale, F. (2015). *The black box society: The secret algorithms that control money and information.* Harvard University Press.

Perelman, L. (2013). Critique of Mark Shermis & Ben Hamner's "Contrasting state-of-the-art automated scoring of essays." *The Journal of Writing Assessment, 6*(1).

Perrotta, C., Gulson, K. N., Williamson, B., & Witzenberger, K. (2020). Automation, APIs and the distributed governance of education. *Big Data & Society, 7*(2), 1–13. https://doi.org/10.1177/2053951720935141

Selbst, A. D., Boyd, D., Friedler, S. A., Venkatasubramanian, S., & Vertesi, J. (2019). Fairness and abstraction in sociotechnical systems. In *Proceedings of the Conference on Fairness, Accountability, and Transparency* (pp. 59–68). ACM. https://doi.org/10.1145/3287560.3287598

Selwyn, N. (2019). *Should robots replace teachers? AI and the future of education.* Polity Press.

Williamson, B. (2017*). Big data in education: The digital future of learning, policy and practice.* Sage.

Winner, L. (1980). Do artifacts have politics? *Daedalus, 109*(1), 121–136.