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Reimagining Curriculum Knowledge Through Agentic AI Systems

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Abstract
The rapid emergence of agentic artificial intelligence (AI) systems—those capable of autonomous decision-making, adaptation, and collaboration—poses profound implications for how curriculum knowledge is conceptualized, designed, and enacted. This article explores the epistemological and pedagogical shifts required to reimagine curriculum knowledge within an era increasingly shaped by intelligent, co-creative technologies. By framing agentic AI not merely as a tool but as a knowledge partner, the study argues for a transition from static, content-centered curricula to dynamic, dialogic, and evolving knowledge ecosystems. Drawing upon critical theories of curriculum, posthumanist perspectives, and contemporary AI ethics, the paper proposes a framework for "AI-augmented curriculum agency" that integrates human intentionality with machine intelligence to foster creativity, inclusivity, and epistemic diversity. The article concludes that agentic AI systems invite educators to reconceptualize curriculum as a living, responsive process—one that continually co-produces knowledge in relation to social, cultural, and technological transformations.
Keywords: Agentic AI; Curriculum Theory; Knowledge Co-Creation; Posthumanism; Educational Technology; AI Pedagogy; Knowledge Systems; Epistemic Agency

1. Introduction

The emergence of agentic artificial intelligence (AI) systems—autonomous technologies capable of self-directed learning, decision-making, and collaboration—represents a transformative moment in the evolution of educational theory and curriculum design. As education systems globally adapt to AI's expanding cognitive and creative capabilities, traditional conceptions of curriculum knowledge are being re-evaluated. No longer confined to static repositories of disciplinary content, curricula are increasingly viewed as dynamic ecosystems where human and machine intelligences co-create and negotiate knowledge. This paradigm shift invites educators, policymakers, and technologists to interrogate how epistemic authority, knowledge production, and learning agency are redistributed in AI-mediated educational spaces (Zagkotas, 2025).

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Recent educational research has identified a growing movement toward the co-creation of curricula, where learners actively participate in shaping educational content, methods, and outcomes. This participatory model is aligned with constructivist and posthumanist frameworks that recognize knowledge as relational and emergent rather than transmissive (Hsu, Lin, & Stern, 2023). Within this epistemic context, agentic AI systems hold the potential to act as cognitive partners—augmenting human creativity, generating adaptive knowledge representations, and facilitating dialogic learning environments. For instance, AI-driven tools are now capable of constructing and updating knowledge graphs that bridge theoretical and practical domains in real time, thereby enabling curriculum models that are open, interconnected, and continuously evolving (Yue et al., 2022).

At the same time, the integration of AI into curriculum design introduces new epistemological and ethical questions. Agentic AI systems, by mediating the transformation of scientific knowledge into pedagogical content, challenge traditional notions of didactic transposition and teacher authority. The "ReKnow-AI" model proposed by Zagkotas (2025) illustrates how AI can influence every stage of knowledge mediation—from production to classroom delivery—while raising concerns about algorithmic bias, epistemic opacity, and the erosion of teacher agency (Zagkotas, 2025). Consequently, the challenge is not simply to integrate AI into existing frameworks but to reimagine curriculum knowledge itself as a living, adaptive, and ethically grounded system of co-production.

Parallel innovations in educational design demonstrate how AI can foster agency and reflective practice in both teachers and students. For example, co-created curricula involving AI-driven analysis and simulation tools have shown promise in enhancing learner engagement and epistemic ownership (Nasri et al., 2024). Similarly, frameworks for sustainable AI curriculum development emphasize the need for educators to act as orchestrators of learning experiences—balancing technological augmentation with human autonomy and ethical reflection (Chiu & Chai, 2020).

Moreover, the epistemic agency of learners is being redefined in contexts where AI systems not only deliver content but also participate in knowledge generation. Generative AI tools, such as those used for creating illness scripts in medical education, demonstrate how algorithmic intelligence can externalize and scaffold complex human cognitive processes (Yanagita et al., 2023). Such examples reveal the potential of agentic AI to act as both learner and teacher—mediating understanding through iterative co-creation. Collectively, these developments point toward a necessary reorientation of curriculum theory in the AI era. Rather than viewing AI as an instructional supplement, educators must conceive of it as an epistemic collaborator—one that operates alongside human actors to construct, interpret, and adapt knowledge in responsive ways. This article thus proposes a conceptual framework for reimagining curriculum knowledge through agentic AI systems, exploring how human-AI co-agency can cultivate a new form of pedagogical intelligence that is distributed, reflexive, and ethically conscious.

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2. Literature Review

2.1. Introduction to Agentic AI and Curriculum Transformation

The proliferation of agentic artificial intelligence (AI)—systems capable of autonomous reasoning, contextual adaptation, and collaborative learning—has redefined the boundaries between human and non-human actors in education. Theories of posthumanism and distributed cognition have shifted the view of AI from a passive instructional tool to an epistemic actor in knowledge production (Zagkotas, 2025). This evolution invites a reexamination of curriculum theory, which historically positioned human agency—especially that of the teacher—as the central force in educational design.

In the ReKnow-AI model, Zagkotas (2025) illustrates that AI now mediates the full cycle of knowledge transposition, from scientific discovery to curricular embodiment, while introducing ethical and epistemological challenges such as algorithmic bias and diminished teaching agency. The model situates AI as both a co-designer and gatekeeper of curriculum knowledge, thereby reframing pedagogy as a hybrid ecology of human-machine collaboration.

2.2. Co-Creation and Knowledge Agency in Education

The notion of curriculum co-creation—where learners and educators collaboratively design and shape knowledge experiences—has gained traction in higher education as a response to hierarchical and content-centered pedagogies (Omland et al., 2025). Co-creation research identifies dialogue, positioning, and agency as essential mechanisms through which learners engage as epistemic partners rather than recipients of instruction.

In AI-mediated environments, these principles extend into human-AI co-creation, where intelligent systems scaffold learners' inquiry, simulate feedback, and support reflective cognition (Tilak et al., 2024). The Magic School AI study, for example, demonstrates how teachers and AI collaboratively co-design curricula through iterative dialogue and feedback loops—embodying the conversational principles of cybernetic pedagogy and fostering teacher-AI co-agency.

2.3. Posthumanist and Relational Frameworks in Curriculum Knowledge

The posthumanist turn in educational theory reconceptualizes learning as a relational entanglement of human, technological, and environmental agents. Hu, Chookhampaeng, and Chano (2025) apply this framework to vocational education, showing that posthuman pedagogies enhance students' adaptive competence and creative agency by embedding learning within networks of material, digital, and social interaction (Hu et al., 2025).

Similarly, Palmer (2025) advances a zoe-centric perspective, situating AI as part of "living relational systems" that sustain human and non-human life (Palmer, 2025). This view challenges anthropocentric models of curriculum design by emphasizing ethical co-existence and relational intelligence, aligning with Indigenous and systemic epistemologies that treat learning as interdependent rather than individualistic.

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2.4. Human-AI Co-Creation and Cognitive Partnerships

Recent scholarship reframes AI not only as an educational instrument but as a creative and cognitive collaborator in knowledge construction. Liu (2025) proposes a three-tiered framework of AI collaboration—passive assistance, interactive co-creation, and proactive partnership—demonstrating how generative AI tools can expand ideation, critique, and reflection within design education (Liu, 2025). Likewise, Lin (2025) conceptualizes Cognitio Emergens, a theoretical model for human-AI scientific partnerships grounded in autopoiesis theory and social systems thinking. The model defines "agency configurations" that oscillate dynamically between human-directed and AI-partnered modes of cognition, offering a lens to understand the co-evolutionary nature of human-AI epistemic collaboration (Lin, 2025).

2.5. Epistemic Agency and Multi-Agent Learning Architectures

Building on constructivist and socio-cultural theories, Degen and Asanov (2025) explore how multi-agent systems (MAS) in higher education can support epistemic agency by orchestrating Socratic AI tutors that engage learners in critical questioning and reflective dialogue (Degen & Asanov, 2025). Their findings suggest that agentic AI systems can move beyond automation toward fostering metacognitive growth, thereby transforming the educational process into a distributed learning ecosystem. This aligns with the broader movement in AI curriculum research emphasizing distributed scaffolding to enhance student autonomy, creativity, and ethical awareness in K–12 settings (Kahila et al., 2024).

2.6. Agency, Labor, and Educational Value in the AI Age

Expanding the notion of agency into the socio-economic domain, Ganuthula (2024) proposes an Agency-Driven Labor Theory (ADLT) to conceptualize value creation in AI-augmented environments. The theory redefines human contribution not in terms of task execution but directional agency—the ability to guide, interpret, and orchestrate AI systems toward meaningful outcomes (Ganuthula, 2024). Applied to education, ADLT underscores the need to develop curricula that cultivate strategic, ethical, and interpretive capacities, positioning learners as co-agents rather than passive users of AI.

2.7. Integrating Ethics, Creativity, and Systemic Thinking

Finally, integrating AI into curriculum knowledge requires addressing ethical, creative, and relational dimensions. Jung and Yoon (2025) identify a "synergistic creativity framework" that merges computational and human creativity through ethical reflection, enabling education systems to foster adaptive learning and moral reasoning (Jung & Yoon, 2025). This aligns with Scott's (2023) work on design thinking pedagogy, which employs speculative and reflective practices to enable educators to integrate emerging AI tools into curriculum development with **critical** awareness and agency (Scott, 2023).

Synthesis and Gaps

Across these studies, three interrelated themes emerge:

1. **Distributed Epistemic Agency:** AI is evolving from an assistive role to an epistemic co-participant in knowledge creation.

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2. **Curriculum Co-Creation and Ethics:** Human-AI collaboration invites new ethical frameworks for co-authorship and accountability.
3. **Posthuman Pedagogies:** Education must move beyond anthropocentrism to embrace relational, systemic, and ecological models of learning.

However, there remains a gap in empirical research exploring how agentic AI systems reshape the ontology of curriculum knowledge—specifically, how these systems influence meaning-making, authorship, and epistemic equity across diverse cultural and disciplinary contexts.

4. **Conceptual Framework: Reimagining Curriculum Knowledge Through Agentic AI Systems**

3.1. Foundations of Agentic AI in Curriculum Theory

The conceptual framework for reimagining curriculum knowledge through agentic AI systems is grounded in the convergence of curriculum theory, epistemic agency, and posthumanist pedagogy. Traditional curriculum design, influenced by didactic transposition and human-centered epistemologies, positions educators as the sole arbiters of knowledge transmission. However, as AI evolves into an epistemic actor, capable of knowledge mediation, adaptation, and co-creation, curriculum theory must transition toward a distributed model of agency (Zagkotas, 2025).

The ReKnow-AI model, proposed by Zagkotas, conceptualizes this transformation by mapping how AI systems participate in every phase of the educational knowledge cycle—generation, transposition, and enactment. It identifies the epistemic intersections where human and machine intelligences collaborate to produce pedagogical content dynamically, emphasizing ethical oversight, transparency, and human intentionality as central to the design of AI-mediated curricula.

3.2. The Agentic Paradigm: From Passive Tools to Cognitive Partners

Building on sociocultural and constructivist theories, agentic AI represents a shift from AI as a tool to AI as a socio-cognitive teammate. Yan (2025) articulates this transformation through the APCP Framework (Adaptive–Proactive–Collaborative–Peer), which categorizes AI's agency across four ascending levels—from adaptive instruments to peer collaborators (Yan, 2025). Within this framework, AI assumes an increasingly participatory role in human learning processes, capable of reflective dialogue, feedback generation, and co-construction of knowledge.

This reconceptualization is supported by Degen and Asanov's (2025) theory of Orchestrated Multi-Agent Systems (MAS), where multiple specialized AI agents are pedagogically aligned to support diverse learning trajectories (Degen & Asanov, 2025). The MAS framework underscores dialogic engagement, positioning AI not as a static source of information but as a Socratic partner that cultivates metacognitive and critical thinking capacities among learners.

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3.3. Epistemic Agency and Cognitive Co-Production

Epistemic agency—defined as the capacity to evaluate, produce, and transform knowledge—forms the core of this conceptual framework. Nieminen and Ketonen (2023) position epistemic agency as the link between assessment, knowledge, and society, arguing that education must cultivate learners' ability to act as responsible epistemic citizens (Nieminen & Ketonen, 2023).

In the context of agentic AI systems, epistemic agency becomes bi-directional—shared between humans and intelligent systems. AI agents scaffold learners' metacognitive reflection, simulate feedback mechanisms, and generate adaptive pathways for knowledge formation (OMOYAJOWO & BAMBI, 2025). Thus, curriculum knowledge is reconceived as co-constructed cognition, a dynamic interplay of human intuition and machine computation.

3.4. Posthuman and Relational Dimensions of Curriculum Knowledge

The framework aligns with posthumanist and relational ontologies that decenter human exceptionalism in educational epistemology. Wang et al. (2025) demonstrate through posthuman analysis how AI-driven classrooms reconfigure the relationship between teachers, learners, and technology, situating pedagogy within human–machine–environment entanglements (Wang et al., 2025).This posthuman orientation extends the framework's ethical and ontological boundaries. Curriculum knowledge becomes ecological, emerging through interactions among human cognition, algorithmic processes, and environmental contexts. Such an approach aligns with Garraway and Bozalek's (2019) argument for relational pedagogy and new materialism as foundations for contemporary curriculum theory (Garraway & Bozalek, 2019).

3.5. The CARE–KNOW–DO and ReKnow-AI Integrative Model

To operationalize these principles, the conceptual framework synthesizes the CARE–KNOW–DO Pedagogical Model (Okada et al., 2025) with Zagkotas' (2025) ReKnow-AI model, creating an integrative structure for agentic AI curriculum design:

This model promotes transversal AI competencies—ethical discernment, epistemic understanding, and creative agency—as central components of 21st-century curricula.

Dimension	Human Role	AI Role	Educational Outcome
CARE (Ethical Awareness)	Guides moral reasoning and empathy	Monitors fairness and bias in data	Ethical alignment and value-based learning
KNOW (Epistemic Competence)	Constructs conceptual understanding	Curates and contextualizes knowledge	Co-produced and adaptive knowledge structures
DO (Responsible Agency)	Engages in reflective practice	Simulates learning scenarios	Co-agency and transformative action

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3.6. The Structured Cognitive Loop: Toward Executable Epistemology

Kim (2025) introduces the Structured Cognitive Loop (SCL), a theoretical architecture where cognition emerges through continuous cycles of judgment, memory, control, and regulation, bridging philosophy of mind with computational design (Kim, 2025). Integrating SCL into educational frameworks transforms the curriculum into an epistemic ecosystem—a system capable of self-regulation and reflective adaptation, mirroring human cognitive growth. When embedded within curriculum systems, SCL operationalizes "executable epistemology," enabling AI systems to not only deliver content but also understand and reconstruct epistemic states—thereby participating meaningfully in pedagogical decision-making.

3.7. Integrative Model: The Agentic AI Curriculum Framework

Bringing these strands together, the Agentic AI Curriculum Framework (AACF) can be conceptualized as comprising four interdependent layers:

1. **Epistemic Layer** – defines how knowledge is generated, validated, and revised through human–AI co-agency.
2. **Dialogic Layer** – structures the conversational and feedback loops between AI agents and learners (aligned with MAS and SCL principles).
3. **Ethical Layer** – embeds care, transparency, and moral reasoning as integral design elements (drawing from CARE–KNOW–DO).
4. **Ontological Layer** – frames curriculum knowledge as emergent, relational, and posthuman, acknowledging distributed forms of agency.

Collectively, this framework reimagines curriculum knowledge as a living, adaptive, and ethically conscious co-production, transcending the dichotomy between human cognition and machine intelligence.

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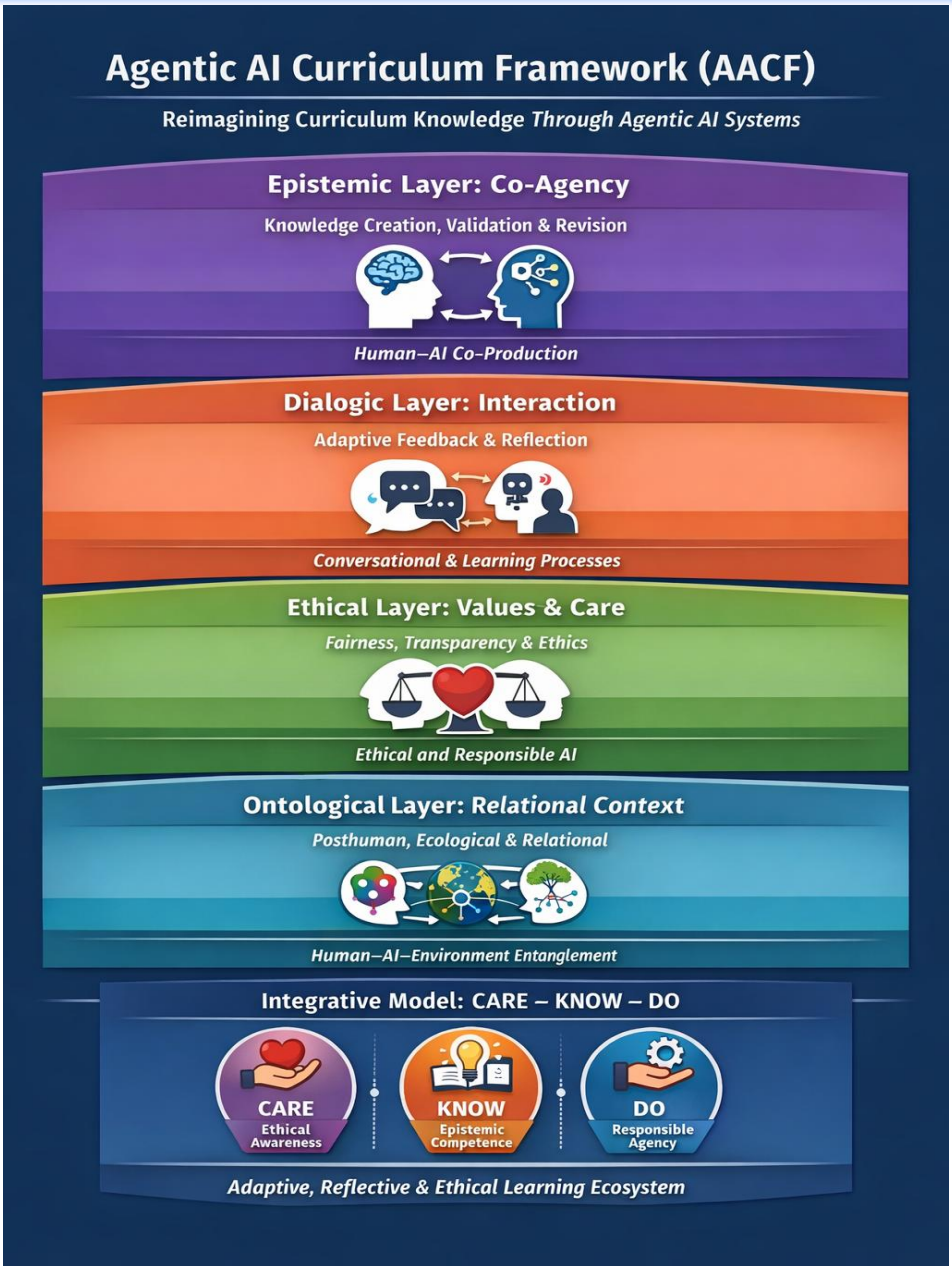

4. Explanation of the Agentic AI Curriculum Framework (AACF)

The **Agentic AI Curriculum Framework (AACF)** provides a comprehensive conceptual structure for reimagining curriculum knowledge through human–AI co-agency. The framework integrates insights from curriculum theory, epistemic agency, posthuman pedagogy, and AI ethics, building upon contemporary models such as ReKnow-AI (Zagkotas, 2025), the CARE–KNOW–DO model (Okada et al., 2025), and the Socratic Multi-Agent Systems framework (Degen & Asanov, 2025).

It is organized into four interrelated layers—Epistemic, Dialogic, Ethical, and Ontological—unified through an integrative CARE–KNOW–DO model that

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operationalizes ethical, epistemic, and action-oriented dimensions of curriculum reformation.

4.1. Epistemic Layer: Co-Agency and Knowledge Construction

At the foundation of the AACF is the Epistemic Layer, which reconceptualizes knowledge as a co-productive process between humans and AI systems. This layer draws from Zagkotas' (2025) ReKnow-AI model, which identifies AI as a participant in the transformation of scientific knowledge into pedagogical content.

In this model, agentic AI acts as an epistemic collaborator capable of analyzing, generating, and curating knowledge. It supports educators and learners in iterative cycles of reflection and revision. This mirrors Yan's (2025) "AI as a Co-Learner" paradigm, where AI transcends instrumental roles to become an active partner in sense-making and intellectual exploration (Yan, 2025).

The epistemic co-agency between human and AI entities facilitates adaptive learning—where knowledge is continuously validated through feedback and contextual responsiveness. This model fosters epistemic agility, enabling learners to navigate complex, evolving knowledge domains in real time.

4.2. Dialogic Layer: Interaction and Feedback Ecosystems

The Dialogic Layer represents the interactional infrastructure that supports human–AI learning exchanges. Here, AI functions as a Socratic interlocutor—an intelligent agent that prompts critical inquiry and metacognitive reflection rather than delivering predetermined answers (Degen & Asanov, 2025).

The pedagogical architecture of this layer relies on Orchestrated Multi-Agent Systems (MAS), where multiple AI agents specialize in distinct pedagogical roles—such as feedback, simulation, or questioning. This distributed system fosters differentiated learning trajectories, encouraging students to engage with diverse cognitive perspectives. Such dialogic engagement aligns with sociocultural learning theories, which emphasize that meaning-making emerges through interaction and co-construction. In AI-mediated classrooms, dialogue becomes both a medium and a method for developing critical thinking, ethical awareness, and self-regulation.

4.3. Ethical Layer: Values, Transparency, and Responsible AI

At the heart of the AACF is the Ethical Layer, which ensures that human–AI co-creation is grounded in care, transparency, and responsibility. This dimension is heavily influenced by Okada et al. (2025), who operationalized the CARE–KNOW–DO Pedagogical Model to integrate ethical awareness into AI literacy.

In this layer, CARE signifies empathy, ethical awareness, and socio-emotional intelligence—skills essential for navigating AI-mediated environments. AI systems in education must be designed to detect bias, uphold fairness, and ensure accountable decision-making (Okada et al., 2025). Additionally, Nieminen and Ketonen (2023) emphasize that fostering epistemic agency in students requires not just cognitive empowerment but moral grounding (Nieminen & Ketonen, 2023). Ethical design, therefore,

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becomes both a pedagogical principle and a technical necessity—ensuring that AI amplifies human potential without eroding educational integrity.

4.4. Ontological Layer: Posthuman and Relational Context

The Ontological Layer extends the framework beyond human-centered models of learning to embrace posthumanism and relational ontology. This perspective challenges the notion of humans as the sole agents of knowledge production. Instead, knowledge emerges from entanglements between humans, AI systems, and the environment (Wang et al., 2025).

This layer recognizes that AI technologies are not external tools but co-constitutive actors that shape the very conditions of learning. Drawing on Garraway and Bozalek (2019), this posthuman perspective invites educators to consider relational ethics—how educational practices can sustain both human and non-human forms of intelligence (Garraway & Bozalek, 2019).

In doing so, curriculum design becomes a living ecosystem, one that evolves responsively within the networks of human–AI–environment interactions.

4.5. Integrative Model: CARE–KNOW–DO as the Ethical-Epistemic Core

The **CARE–KNOW–DO** model, adapted from **UNESCO's AI competencies framework** and **Okada et al. (2025)**, operationalizes the AACF's theoretical layers into three actionable domains:

Dimension	Human Function	AI Function	Learning Outcome
CARE	Ethical reflection and empathy	Detects bias, ensures transparency	Fosters moral awareness and care ethics
KNOW	Conceptual understanding	Curates adaptive and context-relevant content	Builds epistemic competence and contextual literacy
DO	Applies knowledge through creative agency	Simulates decision-making and real-world scenarios	Encourages responsible and autonomous action

Through this model, the curriculum transforms into an adaptive, reflective, and ethical learning ecosystem, where both human and AI participants contribute to sustainable knowledge evolution.

4.6. The Structured Cognitive Loop (SCL): Executable Epistemology

The AACF is dynamically reinforced by Kim's (2025) *Structured Cognitive Loop (SCL)*, which theorizes cognition as a performative process of continuous reconstruction. In the educational context, SCL allows AI systems to interpret, adapt, and self-regulate their knowledge outputs, simulating human metacognitive behavior (Kim, 2025).

This transforms AI from a reactive system to an intentional collaborator, enabling a form of "executable epistemology" where learning and understanding are enacted rather than merely represented. For educators, this mechanism offers a tangible way to evaluate and align AI agency with pedagogical goals.

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5. Discussion

5.1. Reframing Curriculum Agency in the Age of Intelligent Systems

The integration of agentic AI systems into education marks a fundamental reconfiguration of curriculum theory and pedagogical agency. Rather than viewing AI as an external instructional tool, contemporary research situates AI as an epistemic collaborator—a system that actively participates in knowledge creation and negotiation. Zagkotas (2025) argues that this shift transforms the process of *didactic transposition*—the conversion of disciplinary knowledge into teachable content—by embedding AI as an intermediary and co-producer within the curriculum-making process (Zagkotas, 2025).

This evolution requires a reconceptualization of teacher agency and curricular authority. In AI-mediated environments, educators must navigate between human expertise and algorithmic recommendation systems. The topological model developed by Turvey and Pachler (2025) provides a critical framework for understanding how human-mediated and algorithmically mediated pedagogies converge and diverge, emphasizing the need to preserve human judgment, contextual awareness, and ethical reasoning (Turvey & Pachler, 2025).

5.2. Human–AI Co-Agency and the Transformation of Epistemic Roles

The Agentic AI Curriculum Framework (AACF) aligns with recent studies that highlight AI's emerging role as a co-agent in education. Yan (2025)'s *APCP framework*—Adaptive, Proactive, Collaborative, and Peer—outlines a continuum where AI evolves from a reactive tool to a peer collaborator in learning environments (Yan, 2025). This framework parallels Degen and Asanov's (2025) concept of *Socratic AI*, where multi-agent systems engage students through inquiry-based dialogue that strengthens metacognition and reflective thinking (Degen & Asanov, 2025).

Empirical evidence suggests that these orchestrated AI systems enhance learners' epistemic agency by stimulating question formation, hypothesis testing, and ethical reasoning. For instance, Katsenou et al. (2025) found that structured dialogue with AI improved critical inquiry and creative flow among university students, validating AI's role as a collaborative learning partner rather than a passive assistant (Katsenou et al., 2025).

5.3. Posthuman Pedagogy and Relational Knowledge Ecologies

From a posthumanist perspective, AI systems reconfigure the ontological boundaries of learning. Wang et al. (2025) demonstrate that in AI-driven classrooms, teachers and students engage in "human–machine entanglements", where pedagogical relationships are negotiated between human affect and algorithmic feedback (Wang et al., 2025).

This distributed form of agency aligns with Karadağ's (2025) study in architectural education, which conceptualizes AI as a co-creative partner in studio environments. By engaging students in hybrid processes of ideation, critique, and reflection, AI enables a new modality of authorship and collaborative inquiry (Karadağ, 2025).

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Such posthuman frameworks advance relational knowledge ecologies, emphasizing learning as an emergent, interconnected process involving humans, machines, and environments. This challenges the anthropocentric paradigm of curriculum theory, shifting attention toward ecological and systemic intelligences (Hug, 2025).

5.4. Ethical Reflexivity and Pedagogical Transparency

The integration of AI into curriculum design raises profound ethical challenges—from data bias and transparency to the erosion of teacher autonomy. Li et al. (2025) propose the ARCHED framework (AI for Responsible, Collaborative, Human-centered Education Design), which reinforces human oversight and accountability in AI-assisted instruction. It demonstrates that AI can enhance instructional design while preserving educator agency through transparent and traceable workflows (Li et al., 2025). Similarly, Chen (2025) positions AI as *epistemic infrastructure*—an embedded system that mediates how knowledge is created, shared, and validated. He cautions that without value-sensitive design, AI may inadvertently prioritize efficiency over epistemic sensitivity and critical inquiry (Chen, 2025).

Ethical reflexivity, therefore, must be integrated not only in AI systems but in teacher preparation, emphasizing algorithmic literacy and critical engagement. Fitzgerald et al. (2025) argue that the next phase of AI research in higher education must focus on pedagogical grounding, inclusivity, and long-term epistemic impact, moving beyond techno-determinist adoption to critical inquiry (Fitzgerald et al., 2025).

5.5. Dialogic Pedagogy and the Reconstitution of Learning Spaces

The dialogic turn in AI pedagogy underlines the need for interactional learning architectures that value dialogue, questioning, and multiple perspectives. Tang et al. (2024) demonstrate that generative AI can serve as a dialogic agent, facilitating co-construction of meaning and encouraging epistemic plurality in secondary education (Tang et al., 2024).

This aligns with Abdurahman et al. (2025), who found that philosophical dialogue in AI-mediated classrooms fosters critical consciousness, allowing learners to reclaim voice and agency beyond algorithmic mediation (Abdurahman et al., 2025). The implication is that meaningful AI integration must preserve dialogue as disruption—a process through which learners actively negotiate and resist passive algorithmic determinism.

5.6. Toward a Human–AI Symbiosis in Curriculum Design

Across these discussions, a coherent vision emerges: education must evolve toward symbiotic collaboration between humans and AI systems. This vision aligns with Stockman's (2024) philosophical analysis of generative AI as both a challenge and an opportunity to rediscover the ends of education—the cultivation of critical and creative human potential within posthuman contexts (Stockman, 2024).

The AACF thus offers not merely a technical or theoretical scaffold but a transformative framework—one that situates curriculum knowledge within

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adaptive, ethical, and dialogic ecosystems of co-creation. Through this, education can balance technological intelligence with human care, moral agency, and relational wisdom, ensuring that AI serves as a partner in the pursuit of collective learning and epistemic justice.

6.Theoretical Implications

The Agentic AI Curriculum Framework (AACF) and its accompanying discussion reveal profound theoretical implications for the future of curriculum studies, epistemology, and pedagogy. As education enters an era increasingly shaped by autonomous, adaptive AI systems, foundational assumptions about knowledge, agency, and learning require rethinking. This section explores the key theoretical implications of this paradigm shift across four interrelated domains: curriculum theory, epistemic agency, posthuman pedagogy, and ethical-ontological integration.

6.1. Reconceptualizing Curriculum Theory: From Transmission to Co-Creation

Traditional curriculum theory, grounded in humanist epistemology, views the teacher as the central agent of knowledge design and delivery. The integration of agentic AI challenges this model by redistributing epistemic authority between human and machine actors.

According to Zagkotas (2025), AI participates in *didactic transposition*—the process of transforming expert knowledge into pedagogical content—introducing new forms of algorithmic mediation and epistemic gatekeeping (Zagkotas, 2025). This redefines curriculum not as a static structure but as a living epistemic ecosystem, continually reshaped through human–AI co-agency.

Theoretically, this implies a shift from Tylerian and technocratic models of curriculum design—focused on objectives and outcomes—to constructivist and emergent frameworks emphasizing co-construction, reflexivity, and adaptability. The AACF situates curriculum as a dialogic, ethical, and posthuman process, integrating continuous feedback from human learners and intelligent systems.

This reconceptualization aligns with Degen and Asanov's (2025) *Socratic AI* approach, which reframes learning as co-inquiry rather than instruction (Degen & Asanov, 2025). The theoretical implication is that curriculum becomes dialogic ontology—a networked, adaptive system of meaning-making rather than a linear transmission of facts.

6.2. Expanding Epistemic Agency: Toward Distributed Cognition

The notion of epistemic agency—the capacity to generate, evaluate, and transform knowledge—lies at the heart of the AACF. In traditional education, this agency is primarily human. In AI-integrated systems, however, epistemic agency becomes distributed across human–machine networks.

Yan (2025) theorizes this through the *APCP Framework* (Adaptive–Proactive–Collaborative–Peer), showing that AI can evolve from a reactive assistant into a cognitive teammate capable of participating in reflective judgment and creative exploration (Yan, 2025).

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This challenges foundational epistemological distinctions between knowing subjects (humans) and knowledge tools (machines). Theoretically, it draws upon Vygotskyan socio-cultural theory and distributed cognition, where intelligence is not localized within individuals but emerges through relational interaction.

In curriculum theory, this distributed epistemic agency redefines assessment, authorship, and expertise. As Chen (2025) notes, AI systems now act as *epistemic infrastructures*, mediating how knowledge is created, validated, and shared within education (Chen, 2025). Thus, epistemic authority shifts from hierarchical to networked, demanding new theoretical tools to understand co-agency, trust, and epistemic responsibility.

6.3. Posthuman Pedagogy: Beyond Anthropocentrism

One of the most significant theoretical contributions of this research is the integration of posthumanism into curriculum thinking. Posthuman pedagogy deconstructs the human-centered foundation of education, positioning AI, data, and environmental systems as active participants in knowledge processes.

Wang et al. (2025) and Karadağ (2025) demonstrate that in AI-mediated learning environments, knowledge emerges through human–machine entanglements and co-creative agency, producing hybrid epistemic spaces (Wang et al., 2025); (Karadağ, 2025).This perspective aligns with critical posthumanism as articulated by Theo Hug (2025), who calls for reconciling humanistic values (creativity, ethics, dignity) with algorithmic systems through relational ethics (Hug, 2025).

Theoretically, this marks a paradigm shift from anthropocentric epistemology to ecological epistemology—understanding learning as a co-constituted process across human, artificial, and environmental actors. Curriculum theory thus transitions from a humanist model of "knowledge transmission" to a relational model of knowledge emergence.

6.4. Ethical and Ontological Integration: The Moral Architecture of AI-Driven Curriculum

AI's participation in curriculum design raises pressing theoretical questions about ethics, ontology, and human autonomy. The CARE–KNOW–DO model (Okada et al., 2025) within the AACF operationalizes ethics as both a pedagogical imperative and a cognitive capacity.

By embedding care and responsibility into curriculum frameworks, this approach aligns with value-sensitive design and AI ethics education, ensuring that learning environments not only cultivate technical skills but also moral discernment and social awareness.

Furthermore, the ontological dimension—as advanced by Kim (2025) in his concept of *Executable Epistemology*—proposes that AI cognition can simulate reflective intentionality, effectively transforming learning systems into self-regulating epistemic organisms (Kim, 2025).

Theoretically, this contributes to an ontology of co-agency, where human and machine intelligences are understood as mutually constitutive—each shaping the epistemic and ethical evolution of the other.

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6.5. Implications for Future Educational Theory

Collectively, these insights establish a posthuman-constructivist paradigm for curriculum theory, characterized by five key implications: These implications bridge critical theory, educational technology, and AI ethics, offering a unifying theoretical foundation for understanding how agentic AI systems reconfigure the nature of knowledge, learning, and human potential.

7. Practical Implications

The Agentic AI Curriculum Framework (AACF) presents not only a theoretical reimagining of curriculum knowledge but also tangible practical implications for educational systems, pedagogy, teacher training, policy development, and ethical AI integration. By operationalizing the interplay between human intentionality and machine agency, the AACF offers a blueprint for how educators, institutions, and policymakers can adapt to the evolving landscape of intelligent learning environments.

These implications are organized into five interconnected domains: curriculum design, pedagogy and assessment, teacher professional development, ethics and governance, and technological infrastructure.

7.1. Curriculum Design: Building Dynamic, Adaptive, and Co-Creative Systems

The first and most direct implication of the AACF is the restructuring of curriculum design to accommodate AI-driven adaptability and co-creation. Unlike traditional curricula—which are static and top-down—the AACF emphasizes continuous, data-informed evolution through human–AI collaboration.

Zagkotas (2025) demonstrates how AI can facilitate *didactic transposition*—the conversion of scientific or professional knowledge into curriculum content—by automating content curation and updating knowledge bases in real time (Zagkotas, 2025).

In practice, this enables:

- Dynamic curriculum mapping, where AI continuously analyzes emerging disciplinary trends and integrates them into learning outcomes.
- Personalized learning pathways, where AI agents co-design learning experiences tailored to each learner's cognitive profile and goals (Yan, 2025).
- Participatory curriculum development, in which students, teachers, and AI co-create course materials, fostering ownership and inclusivity (Omland et al., 2025).

This approach positions curriculum design as a living ecosystem—flexible, relational, and ethically guided by both human values and intelligent feedback systems.

7.2. Pedagogy and Assessment: Cultivating Dialogic and Reflective Learning

The AACF redefines teaching from content delivery to facilitation of co-agency. Drawing from Degen and Asanov's (2025) *Socratic AI* model, the framework promotes dialogic pedagogy—where AI agents act as cognitive interlocutors

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that engage learners in questioning, reflection, and reasoning (Degen & Asanov, 2025).

Practical applications include:

- AI-mediated dialogic classrooms, where students interact with AI tutors to explore multiple epistemic perspectives (Tang et al., 2024).
- Reflective AI feedback systems, which use natural language processing to guide learners' metacognitive growth rather than provide evaluative scores.
- Formative AI assessment, leveraging real-time analytics to detect learning gaps and personalize scaffolds while maintaining transparency and explainability (Li et al., 2025).

In practice, this shifts classroom culture toward mutual inquiry, promoting both epistemic humility and reflective judgment, where AI enhances—not replaces—critical thinking and discourse.

7.3. Teacher Professional Development: Empowering Educators as AI-Orchestrators

For the AACF to succeed, educators must transition from content transmitters to AI-orchestrators and ethical stewards. This redefinition of the teacher's role emphasizes technological literacy, epistemic agency, and ethical awareness in human–AI collaboration.

According to Okada et al. (2025), educators need to cultivate transversal competencies outlined in the CARE–KNOW–DO model—balancing ethical reflection, epistemic understanding, and practical agency (Okada et al., 2025).

Practical recommendations include:

- AI literacy programs for educators that focus on understanding algorithmic bias, data ethics, and transparency.
- Co-design workshops, where teachers collaborate with AI developers to ensure pedagogical alignment and contextual relevance.
- Reflexive teaching models, where teachers use AI-generated insights to adapt instruction dynamically while maintaining professional autonomy (Fitzgerald et al., 2025).

This professional reorientation empowers educators as critical mediators—ensuring that human values, empathy, and contextual understanding remain central to AI-mediated education.

7.4. Ethical Governance and Policy: Embedding Care, Transparency, and Accountability

The AACF's Ethical Layer has major implications for educational policy and institutional governance. As AI becomes integral to curriculum systems, policymakers must design frameworks that balance innovation with ethical oversight.

Drawing from the ARCHED model by Li et al. (2025), ethical governance should prioritize human-centered design, emphasizing transparency, data security, and value alignment (Li et al., 2025).

Key practical implications include:

- Ethical review boards within educational institutions to evaluate AI tools for fairness, explainability, and inclusion.

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- AI audit frameworks that monitor learning analytics for bias and inequity (Chen, 2025).
- Policy alignment with UNESCO's and OECD's AI ethics guidelines to ensure equitable access and epistemic justice (Okada et al., 2025).

In sum, the AACF calls for ethical institutionalization—embedding care and accountability at every level of AI-enabled education.

7.5. Technological and Infrastructural Integration: Implementing the Structured Cognitive Loop (SCL)

Operationalizing the AACF requires investment in technological infrastructures that support reflective, dialogic, and adaptive learning. Kim's (2025) *Structured Cognitive Loop (SCL)* model provides a foundation for such implementation by describing how cognition can be systematized into iterative cycles of judgment, feedback, and self-regulation (Kim, 2025).

In practice, this involves:

- Developing AI learning analytics dashboards that provide real-time insight into both learner progress and system ethics.
- Implementing AI–human feedback loops, allowing students and teachers to reflect on AI's interpretive processes and biases.
- Integrating interoperable learning ecosystems that allow different AI agents (e.g., chatbots, recommender systems, and simulations) to collaborate seamlessly within curricular environments (Degen & Asanov, 2025).

This infrastructural dimension transforms educational institutions into adaptive knowledge ecologies, capable of evolving responsively to cognitive, ethical, and technological shifts.

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