

# Augmenting Inquiry, Preserving the Core: Stenbom and Garrison on AI's Role and Human- Centered Learning Within the Community of Inquiry (CoI) Framework



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**CRITICAL SCHOLARLY  
CONVERSATION**

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## ABSTRACT

This dialogue with D. Randy Garrison and Stefan Stenbom revisits the foundational Community of Inquiry (CoI) framework in the context of rapid digital transformation and the rise of artificial intelligence (AI). Originally conceived for text-based online learning, the framework's core elements—Social, Cognitive, and Teaching Presence—remain robust guides for fostering deep, collaborative learning in today's complex multimodal and multilayered environments. The conversation explores how these presences manifest differently across various media, acknowledging that while indicators may evolve, the underlying structure remains constant. A central theme is the integration of AI, viewed primarily as a tool capable of augmenting human roles within the existing CoI structure. AI can support teaching presence tasks, simulate social cues, and even assist cognitive processes, but rather than constituting a new presence, it highlights the robustness and adaptability of the existing model in accommodating new technologies. However, maintaining the authenticity of community and safeguarding genuine emotional connection in AI-rich environments are critical challenges. The conversation highlights the potential risk of AI flattening inquiry into mere information assimilation if not implemented thoughtfully. Ultimately, the CoI framework is presented as an essential guide, emphasising the preservation of human agency, critical reflection, and collaborative meaning-making as core educational purposes, even as technology advances. The need to deliberately slow down inquiry for reflection in fast-paced, AI-driven contexts is further stressed.

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## INTRODUCTION: PRESENCE IN THE ALGORITHMIC AGE

How can online learning truly adapt to individual student needs while fostering the deep, collaborative inquiry essential for higher education, especially as digital environments become increasingly complex and infused with artificial intelligence? This question lies at the heart of contemporary online pedagogy. For over two decades, the Community of Inquiry (CoI) framework, introduced by Garrison et al. (2000, 2001), has served as a foundational model for understanding and designing effective online and blended learning experiences (Bozkurt, 2019; Kim & Gurvitch, 2020; Martin et al., 2022; Stenbom, 2018). Grounded in constructivist principles and the work of John Dewey (1933; 1959), the framework posits that meaningful learning emerges from the dynamic interplay of three core, interdependent elements: Teaching Presence (the design, facilitation, and direction of cognitive and social processes to achieve learning outcomes), Social Presence (participants' ability to project themselves socially and emotionally), and Cognitive Presence (the extent to which learners construct meaning through sustained reflection and discourse) (Kim & Gurvitch, 2020; Garrison et al., 2000; Garrison & Arbaugh, 2007).

Originally conceptualised within the primarily text-based environments of early computer conferencing, the CoI framework has demonstrated remarkable adaptability. Its application has evolved alongside technology, shifting from primarily an analytical tool for assessing interactions to a robust guide for course design across diverse online and blended settings (Castellanos-Reyes, 2020; Flock, 2020; Maré & Mutezo, 2025). Extensive research has validated its structure and the reliability of its associated survey instrument (Arbaugh et al., 2008; Stenbom, 2018; Swan et al., 2008) and consistently demonstrated correlations between the presences and key student outcomes like perceived learning and satisfaction (Martin et al., 2022; Richardson et al., 2024).

However, the current era of profound digital transformation—characterised by increasingly multimodal communication, immersive virtual spaces, and the rapid integration of sophisticated Artificial Intelligence (AI)—presents both new challenges and intriguing possibilities for the CoI framework. How does this framework, fundamentally centered on human community and collaborative inquiry, function when non-human agents can facilitate discussions, simulate social interaction, and personalise learning pathways (Anderson et al., 2025; Stenbom & Garrison, n.d.)? Does the emergence of AI necessitate a rethinking of the core presences, or can AI's contributions be understood as augmenting the existing structure? These questions underscore the importance of examining the CoI's ongoing evolution and its role in shaping the development of effective, engaging, and potentially AI-enhanced learning communities.

It is within this dynamic context that we engage with Professor D. Randy Garrison, one of the original architects of the community of inquiry, and Associate Professor Stefan Stenbom, one of the leading researchers on this subject area.

## A SCHOLARLY DIALOGUE ON THE FUTURE OF COMMUNITY OF INQUIRY

Professor Garrison and Professor Stenbom, it's a privilege to have this dialogue with you both. Professor Garrison, the CoI framework, which you co-developed, has been a guiding light for countless educators, providing a clear and robust model for creating deep and meaningful learning experiences online. The conceptualisation of Teaching, Social, and Cognitive Presence has become part of the essential vocabulary of our field. Professor Stenbom, your work and your collaborations with Professor Garrison have significantly advanced our understanding of the framework's application and evolution, particularly as we navigate new technological frontiers. Now, as this field enters a new phase defined by AI and profound digital transformation, and considering your ongoing collaborative work exploring these specific intersections, we are eager to explore the evolution and future of the CoI. This conversation will address how the framework adapts to new technologies, the challenge AI poses to the nature of 'presence', and your collective vision for the future of collaborative online learning.

## THE EVOLUTION OF THE COI IN NEW DIGITAL ENVIRONMENTS

Aras Bozkurt: The CoI framework was developed when online learning was largely text-based. Now, in an era of digital transformation, we have immersive virtual worlds, persistent social

media spaces, and collaborative video platforms. How has your understanding of the CoI framework evolved to account for these rich, multimodal environments? Do the core presences (teaching, social, cognitive) manifest differently, or are new indicators required to identify them in these complex online networks?

D. Randy Garrison & Stefan Stenbom: The CoI framework introduced in Garrison et al. (2000, 2001) was conceptualised around the turn of the century to legitimise online education at a time when interaction was primarily text-based. However, the framework itself draws on pedagogical and philosophical roots from Dewey (1933, 1959), Lipman (1991, 2003), Peirce (1955), Vygotsky (1978), etc., ideas grounded in critical thinking and collaborative inquiry in physical settings. The text-based format of early online learning should therefore be seen as an implementation shaped by its time, not as a limitation of the model. Furthermore, the framework's "core function is to manage and monitor the dynamic for thinking and learning collaboratively" (Garrison, 2017, p. 24). The original conceptualisation was based on text-based communication (i.e., forum discussions and computer conferencing) as the empirical case, whereas contemporary research and practice involving the CoI encompass multiple modalities for interaction, including video, audio, symbols/figures, and text.

As digital transformation has expanded through multimodal collaboration platforms, the CoI framework remains equally relevant and powerful. Its enduring strength lies in its core assumption: that *meaningful learning experiences arise through the interplay of Teaching, Social, and Cognitive Presence*, processes that can manifest through any medium or modality. What does vary, however, is how these presences are expressed within diverse communicative contexts.

A particularly illustrative example is the concept of Social Presence, which in early text-based environments was primarily conveyed through written discourse, sometimes supported by emoticons or other textual cues (Garrison, 2024). In contrast, contemporary voice-, video-, and symbol- or visual-based communication allows Social Presence to be articulated through paralinguistic, intonation, facial expressions, gestures, visual representations, and other auditory, visual, or symbolic signals (Bowden & Moore, 2025). Consequently, the indicators associated with the categories of Social Presence (i.e., Affective/Interpersonal, Open Communication, and Group Cohesion) have been gradually refined to more accurately reflect this broader range of communicative forms, extending beyond those grounded solely in text.

The same development applies to Teaching Presence (i.e., Design, Facilitation, and Direction) and Cognitive Presence (i.e., Triggering Event, Exploration, Integration, and Resolution). We now have access to a much wider set of communicative tools and modalities through which discourse unfolds, necessitating a reinterpretation of the indicators that capture the categories within each presence. However, the underlying structure of the framework itself remains conceptually robust.

That said, text-based interaction still holds unique value today, as much communication within multimodal environments continues to involve text. Moreover, the slower and more deliberate nature of writing encourages reflection and the deeper formulation of ideas, thereby activating higher-order cognitive processes. Thus, text continues to play a distinctive and valuable role in how we think and interact, even amid increasingly multimodal forms of communication.

In fact, we argue that the CoI framework is not limited to online or blended education but also applies to physical learning environments (Stenbom & Cleveland-Innes, 2024). The framework was originally developed to describe the structure and communicative dynamics of the learning experience within a community of inquiry. Although it emerged from the practical case of an online course, its intellectual foundations are firmly rooted in classroom-based theories of learning. There is, therefore, no conceptual barrier preventing its application to in-person education, where the same principles of collaboration, dialogue, and shared inquiry underpin meaningful learning experiences. One might even argue, however, that in today's digital world, a purely physical learning environment may no longer exist.

While the complexity of digital environments has increased, the strength of the CoI framework lies in its coherence and parsimony. At the same time, research exploring the framework in AI-enhanced environments remains limited. Before considering any modifications or extensions, it is essential to examine how the existing presences help us understand and guide learning within

these contexts. Future studies may eventually reveal that certain dimensions of the model require reinterpretation or refinement, but such conclusions must rest on a solid empirical and theoretical foundation. The framework's enduring value, therefore, lies in its capacity to guide this emerging research while remaining conceptually stable and adaptable.

## AI'S IMPACT ON THE THREE PRESENCES

Aras Bozkurt: AI agents are now capable of facilitating discussions, providing feedback, and summarizing content—tasks traditionally associated with Teaching Presence. They can also simulate social interaction. Does the emergence of these capable AI agents require a fundamental update or extension to the three presences? For example, could there be a form of 'synthetic' or 'agentic' presence, or do AI's contributions simply augment the existing human presences? How do we maintain the authenticity of community when non-human agents are key participants?

D. Randy Garrison & Stefan Stenbom: AI tools can act as a pedagogical guide, co-facilitator, or participant within a community of inquiry (Stenbom & Garrison, n.d.). At the same time, it may also function as a learning resource, comparable to a textbook or a website, depending on how it is implemented and the intentions behind its use. It can support instructors and learners alike by monitoring inquiry, managing discussions, providing scaffolding, generating summaries, or offering adaptive prompts that sustain engagement. Through such contributions, AI systems increasingly become integrated into the communicative dynamics of the learning process.

Importantly, AI does not exist outside the structure of the CoI framework—it can express the three presences within it. In terms of Teaching Presence, AI can design, facilitate, and direct discourse by modeling examples, guiding inquiry, or providing formative feedback. When it comes to Social Presence, AI may simulate interpersonal connection through, for example, tone, empathy cues, or conversational responsiveness that fosters openness, affect, and cohesion. To a limited degree, AI can even display elements resembling Cognitive Presence, as it iteratively refines its models through feedback and data, though this process remains fundamentally different from human inquiry.

However, the authenticity of the learning community ultimately depends on maintaining human intentionality and agency. In our view, AI should augment rather than replace human roles within the community. When thoughtfully designed and implemented, AI tools have the potential to stimulate deeper critical thinking, encouraging learners to question, reflect, and engage in dialogue that extends beyond surface understanding. Yet, this outcome is far from guaranteed. We're increasingly concerned that learners tend to treat AI-generated output as a definitive answer rather than as a prompt for inquiry, which risks undermining critical thinking and engagement. Ensuring that AI is used to foster higher-order reasoning rather than to shortcut it is therefore essential to maintaining an authentic community of inquiry. The core of education is sustained through a sceptical and reflective attitude that ensures learners remain active constructors of knowledge rather than passive recipients of AI-generated content.

From a theoretical standpoint, these developments demonstrate the flexibility and robustness of the CoI framework. Rather than requiring the introduction of a new presence, AI participation illustrates how the existing presences, Teaching, Social, and Cognitive, can be expressed through both human and artificial actors. The framework, thus, continues to provide a coherent model for understanding learning as a process of shared inquiry, even in environments where human and non-human agents interact to co-construct knowledge.

## EMOTIONAL PRESENCE IN AN AGE OF HUMAN-AI INTERACTION

Aras Bozkurt: You have explored 'emotional presence' as a critical, underlying dimension of inquiry and community. As human-AI interaction becomes more common, with AI designed to be empathetic and responsive, how do you approach this concept? Can an AI genuinely contribute to the emotional climate of a learning community, or does its involvement risk creating a perception of emotion without authentic connection? What is the role of authentic human emotion in the inquiry process, and how must we safeguard it in AI-rich environments?"

D. Randy Garrison & Stefan Stenbom: Emotion plays a foundational role in how inquiry and community unfold. It sustains motivation, trust, and collaboration, providing the energy and cohesion that make shared inquiry possible. Rather than existing as a separate component,

emotion permeates all dimensions of learning, influencing how participants connect, reflect, and construct meaning together. The concept of Emotional Presence has been explored in a series of papers (cf. [Cleveland-Innes & Campbell, 2012](#); [Majeski et al., 2018](#)).

Currently, we regard emotions as an important and foundational dimension within the CoI framework, essential for sustaining motivation, connection, and collaboration. Acknowledging that the role of emotions may appear in different ways in empirical data, we, for simplicity and clarity, regard emotions as an important and foundational dimension—one that supports motivation, connection, and collaboration across the three presences, rather than constituting a separate presence of its own. It is most strongly connected to Social Presence, particularly the Affective/Interpersonal category, but also contributes meaningfully to all elements and categories. A contemporary description of Social Presence gives greater weight to the emotional aspect, describing it as how learners “feel socially and emotionally connected with others in an online environment” ([Swan, 2020, p. 80](#)). In certain empirical situations, treating it as a separate construct may provide the most profound understanding of the educational experience, but our current stance is that, in the vast majority of cases, treating it as integrated and indispensable within the existing framework provides the most consistent interpretation.

Within a community of inquiry, emotional dynamics are most visible in interpersonal communication and relationships, but they also shape teaching and cognitive engagement and are perhaps even more prominent within individuals’ critical thinking. Emotion affects how understanding is expressed, how tone is interpreted, and how meaning is negotiated among participants. It is, therefore, not a peripheral factor but an essential condition for meaningful learning.

Whether AI can genuinely contribute to the emotional climate of a learning community depends largely on human perception. If participants perceive AI responses as empathetic or emotionally attuned, those interactions can feel authentic and supportive. Authenticity in these exchanges is relationally constructed; it arises not from the technology itself, but from how humans interpret and respond to it.

At the same time, there is a risk that AI expressions of empathy or emotion become superficial or simulated, creating a sense of emotional engagement without genuine connection. Such interactions can erode trust and diminish the emotional integrity of the community.

Because of this, educators and designers carry an increased responsibility for maintaining authenticity in AI-rich environments. This involves making AI’s role transparent, clarifying its limitations, and using pedagogical strategies that foreground human reflection, empathy, and awareness. Human participation and, when needed, intervention are essential to ensure that the emotional and social dimensions of learning remain authentic and grounded in trust, commitment, and shared purpose.

Authentic human emotion remains central to the inquiry process. It drives curiosity, sustains perseverance, and deepens the collaborative effort to construct meaning. Human emotional connection gives inquiry its sense of shared purpose and belonging, qualities that cannot be fully reproduced by artificial systems.

The challenge, then, is not to replicate human emotion through AI, but to safeguard it. Well-designed learning environments can use AI to support emotional well-being and engagement, but always with the understanding that *authentic emotional connection is a uniquely human capacity that must anchor the community*. In doing so, we preserve the genuine, human-centered character of collaborative inquiry even as AI becomes a more common participant in it.

## **FUTURE VISION FOR THE COMMUNITY OF INQUIRY**

Aras Bozkurt: Looking at the future of online learning in our networked, AI-driven society ([Loro & Bozkurt, 2026](#)), what is your overarching vision? The CoI framework has always placed a collaborative, human community at the heart of the educational experience. As technology becomes more powerful, what do you see as the greatest opportunity for enhancing that sense of community, and what is the most significant threat to it? What core principles of a community of inquiry should guide us as we navigate this future?

D. Randy Garrison & Stefan Stenbom: Our vision for the future of a community of inquiry is one where human learning remains at the center, even as technology becomes increasingly capable and pervasive. The framework's core idea, that meaningful learning emerges through critical/reflective thinking and collaborative discourse, should continue to guide us. AI may serve as a supportive and complementary partner in this process, strengthening rather than replacing the human capacity for reflection, judgment, and creativity.

The greatest opportunity lies in using AI to support what humans find difficult to sustain at scale. Intelligent systems can monitor inquiry processes, identify when learners need assistance, and offer timely feedback and alternative perspectives. By doing so, AI can help instructors and learners maintain engagement and continuity. When designed thoughtfully, AI tools may extend instructors' ability to identify and support each learner individually while also enriching the diversity of viewpoints that inform collaborative inquiry. However, these developments require clear educational "guard rails" to ensure that AI is implemented in ways that preserve authenticity and uphold the best interests of the learning community.

However, the true potential of AI is not in accelerating access to information but in stimulating higher-order thinking and shared metacognition. When used well, AI can prompt learners to question, reflect, and manage their own and others' thinking processes—acting as a partner in dialogue rather than a provider of answers. It can contribute to a relationship of inquiry in which humans and AI engage in meaning-making together. An illustrative example of how AI can be used within this framework is provided by Nasr et al. (2025), who adapted Cognitive Presence to support critical thinking in generative AI contexts. They conclude that human and machine intelligence should not be seen as substitutional but as co-participants in inquiry—opening new epistemic horizons while ensuring that human oversight, critical reflection, and thoughtful assessment remain at the center of learning.

The greatest threat, conversely, is that we allow AI to flatten inquiry into mere information assimilation. If learners accept AI outputs uncritically, they risk becoming passive recipients rather than active constructors of knowledge. In a world already driven by efficiency and immediacy, the temptation to bypass reflection is strong. When this happens, AI undermines rather than enhances the spirit of inquiry. Equally, we must be mindful that isolation, whether human or technological, remains one of the greatest threats to authentic community. Shared metacognition and collaborative inquiry are the defining safeguards against such fragmentation.

The core principles of the CoI framework remain our guide as we navigate this future. We must preserve the notion of community as a space for dialogue, collaboration, and mutual understanding. We must continue to see inquiry as a reflective process that integrates Teaching, Social, and Cognitive Presence. And above all, we must sustain higher-order thinking and shared metacognition as the heart of educational purpose in an AI-rich world.

Ultimately, it is the framework in its entirety that should guide us forward. Instructors must continue to design meaningful learning experiences, facilitate learners, and, when appropriate, provide direction. Within this, AI can serve as a complementary tool—supporting the design, facilitation, and direction of learning where human limitations exist. In terms of Social Presence, we must continue to foster open communication, group cohesion, and authentic interpersonal connection and affection, even in environments where AI plays a mediating role. From a cognitive standpoint, the inquiry process must remain centered on meaning-making through triggering events, exploration, integration, and resolution.

In essence, the core of a community of inquiry should guide how we shape the future of learning in an AI-enhanced world. In this sense, the CoI framework offers both a map and a moral compass—reminding us that even as technology evolves, the essence of education remains human.

AI in learning environments will undoubtedly accelerate many aspects of education, particularly information processing and delivery. Yet this very speed creates a new responsibility for educators: to slow down the inquiry process and make space for reflection, discourse, and meaning-making.

Aras Bozkurt: You emphasise AI's potential to stimulate higher-order thinking and act as a partner in dialogue rather than just an answer provider. What specific pedagogical designs or interaction protocols do you envision that actively scaffold this partnership, preventing students

from defaulting to passive reception of AI output, especially in complex inquiry tasks? How do we ensure AI promotes divergent thinking and exploration, not just efficient convergence?

D. Randy Garrison & Stefan Stenbom: We envision pedagogical designs where the learner–AI relationship is intentionally dialogic and inquiry-oriented rather than transactional. This means structuring activities that require students to engage critically with AI output through questioning, comparison, and reflection. For instance, learners can be asked to prompt the AI for multiple perspectives on a problem, evaluate the reasoning behind each, and articulate their own synthesis. Interaction protocols may include iterative cycles of generate–critique–revise, where students must justify revisions based on their understanding rather than simply accepting the AI’s suggestions. Such structures position AI as a thinking partner that provokes reflection and metacognition. To support divergent thinking, prompts can deliberately seek uncertainty, alternative explanations, or creative constraints—thus steering interaction away from mere efficiency toward exploration and conceptual growth.

Aras Bozkurt: You highlight the responsibility to “slow down the inquiry process” for reflection in an AI-accelerated world. How can course design and teaching presence practically achieve this counterbalance? What specific strategies can instructors use to foster deep reflection when AI tools offer speed and immediate (though potentially superficial) resolution?

D. Randy Garrison & Stefan Stenbom: We view the responsibility to slow down the inquiry process as fundamentally about protecting the *process of learning* itself, learning understood as an active verb rather than a finished product. In an AI-accelerated environment, there is a growing risk that inquiry becomes reduced to efficient problem-solving and rapid answer retrieval. Teaching presence can counterbalance this tendency by deliberately structuring moments that sustain engagement with the ongoing process of making meaning. This can be achieved through inquiry designs that emphasise iteration, reflection, and dialogue—where learners must pause to interpret, critique, and reframe AI-generated ideas before moving forward. By centering the process rather than the product of learning, course design encourages a slower, more deliberate rhythm that aligns with the depth and complexity of genuine understanding.

## CONCLUSION: SYNTHESISING THE DIALOGUE

This conversation with D. Randy Garrison and Stefan Stenbom reaffirms the enduring relevance of the CoI framework while simultaneously probing its application in the rapidly evolving landscape of digital education. The dialogue highlights that the core principles of Teaching, Social, and Cognitive Presence remain fundamental for meaningful learning, regardless of the medium. Even as learning environments shift from primarily text-based interactions to rich, multimodal platforms and incorporate sophisticated AI, the framework’s strength lies in its focus on the collaborative process of inquiry.

A key takeaway is the perspective that AI, in its current form, primarily functions as a technology within the CoI framework, capable of augmenting existing presences rather than constituting a new, separate presence. AI can assist with Teaching Presence tasks (design, facilitation/feedback, direction), simulate aspects of Social Presence, and even support elements of Cognitive Presence through scaffolding or providing alternative perspectives. However, the crucial role of authentic human interaction, emotional connection, and intentionality remains paramount. The potential for AI to enhance efficiency and scale personalisation is significant, but it must be wielded carefully to avoid flattening the inquiry process into mere information retrieval, thus preserving the critical thinking and collaborative meaning-making at the heart of a community of inquiry.

## THE COI IN AN ERA OF DIGITAL TRANSFORMATION AND AI

The synthesis highlights a central tension: the CoI framework champions a deeply *human* collaborative experience, while digital transformation introduces increasingly powerful *non-human* actors (AI). Can the framework truly accommodate this shift without dilution? The assertion that AI merely augments existing presences seems plausible now, but relies on AI remaining a sophisticated technology rather than an autonomous participant.

The discussion around AI’s potential to simulate social and emotional cues touches upon a critical point. While participants might *perceive* AI interactions as supportive, does this perceived presence equate to the authentic trust and cohesion necessary for deep inquiry? If Social

Presence serves as a crucial foundation for Cognitive Presence, relying on potentially superficial AI interactions might inadvertently weaken the very collaborative inquiry the framework seeks to foster. Furthermore, the risk of AI reducing cognitive engagement by providing easy answers directly challenges the core goal of developing higher-order thinking through exploration, integration, and resolution. This necessitates a deliberate pedagogical focus on using AI as a *catalyst* for inquiry, not a substitute for it. Educators must actively design learning experiences that leverage AI to prompt deeper questioning and reflection, ensuring technology serves, rather than subverts, the educational mission.

## BEYOND AUGMENTATION: UNCHARTED TERRITORIES AND PROVOCATIONS

As part of the ongoing dialogue about the evolving nature of inquiry, Garrison and Stenbom emphasize that the CoI framework is not a perfect or final model, but one that must continue to evolve as new forms of learning and technology emerge. AI represents a disruptive technological force that necessitates a re-envisioning of what a community of inquiry can be—prompting the need to revisit the framework, both in terms of its foundational assumptions and its indicators, and potentially, in the longer run, to undertake broader revisions. However, generative artificial intelligence in particular is still in such an early and rapidly developing stage that it would be premature to make any definitive claims about its broader theoretical implications yet. Substantial further research is needed before we can meaningfully assess whether a more profound reconceptualisation of the framework will ultimately be required.

Extending this line of thought, what happens when AI transcends its role as a sophisticated tool and begins exhibiting forms of agency, learning, and adaptation *within* a community of inquiry itself? Current discussions frame AI as augmenting human presences, but this assumes a static, controllable relationship. What if generative or agentic AI (Artsin & Bozkurt, 2026), interacting dynamically with participants and content, develops emergent behaviors or insights that shape the inquiry in unforeseen ways?

- Can the existing categories of Social, Cognitive, and Teaching Presence adequately capture the contributions (or disruptions) of an AI that isn't just executing pre-programmed functions but is actively *learning* from the discourse?
- What does 'Cognitive Presence' mean when a significant part of the 'cognition' being expressed originates from a non-human intelligence processing information differently than humans do? Does the practical inquiry model fully apply?
- How does the concept of 'community' itself transform when these powerful, adaptive, non-human agents become persistent participants? Is 'shared understanding' achievable between human and artificial intelligences in the same way it is among humans?
- If AI can generate increasingly convincing 'social' and 'emotional' cues, how do we ensure the *authenticity* of the learning experience and safeguard genuine human connection, which is argued to be foundational?
- Are pedagogical 'guardrails' sufficient when the technology itself is evolving at an exponential pace, potentially outpacing our ability to understand and regulate its impact on learning dynamics?

These questions push beyond the current paradigm of AI as an augmentive supportive tool and force us to confront the possibility of fundamentally altered learning ecologies. The CoI framework, conceived for human interaction, may need radical reinterpretation to remain relevant in a future where intelligence is increasingly hybrid.

## SUSTAINABLE DEVELOPMENT GOALS (SDGs)

This study is linked to the following SDG(s): Quality Education (SDG 4).

## ETHICS AND CONSENT

This study was conducted collaboratively by all three researchers, who are also listed as the sole authors of the work. As the research did not involve external participants and was based

entirely on voluntary collaboration between the authors, no formal ethical approval was required. Participation in the study was based on mutual consent and voluntary involvement of the researchers.

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## COMPETING INTERESTS

The authors have no competing interests to declare.

## AUTHOR CONTRIBUTIONS (CRediT)

Stefan Stenbom: Conceptualization, writing—original draft preparation, writing—review and editing; D. Randy Garrison: Conceptualization, writing—original draft preparation, writing—review and editing; Aras Bozkurt: Conceptualization, methodology, supervision, writing—review and editing. All authors have read and agreed to the published version of the manuscript.

## AUTHOR NOTES

Based on *Academic Integrity and Transparency in AI-assisted Research and Specification Framework* (Bozkurt, 2024), the authors of this paper acknowledge that the paper was proofread and edited with the assistance of Google's Gemini (Versions as of July 2025) and ChatGPT 5, complementing the human editorial process. The human authors critically assessed and validated the content to maintain academic rigor. The authors also assessed and addressed potential biases inherent in the AI-generated content. The final version of the paper is the sole responsibility of the human authors.

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