

The AI Tsunami: Reorienting CSCL Toward a Humanistic, Justice-Oriented, and Planet-Conscious Future

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Abstract

Computer-supported collaborative learning (CSCL) has always developed alongside the technologies it studies, but Generative Artificial Intelligence (GenAI) is different in kind. This paper argues that GenAI constitutes not a continuation of prior technological shifts but a qualitative rupture, a tsunami, that demands a fundamental reorientation of CSCL scholarship. We trace the field's maturation through three developmental waves, from a Systems Wave grounded in distributed cognition to a Humanistic Wave centered on enculturation and agency and then to a Sociopolitical Wave reckoning with identity and power, and show that GenAI arrives precisely as CSCL was beginning to deepen its axiological commitments. Even with GenAI's potential benefits, we argue that algorithmic forces now threaten to flatten the very human agency, collective wisdom, and plurality that constitute meaningful collaborative learning. When AI smooths contributions into a common register, differences in learners' understanding are concealed rather than resolved, and groups proceed under an illusion of shared understanding. In response, we call on the field to organize its next twenty years around three commitments: an expanded humanism that insists on the irreducible value of human agency and authentic experience, an explicit justice orientation, and a planetary mandate that widens both the problems CSCL takes on and the company it keeps.

Introduction

As the International Journal of Computer-Supported Collaborative Learning (ijCSCL) marks its twentieth anniversary, our field is witnessing change of a different order. When Kienle and Wessner (2006) surveyed a decade of international CSCL conferences in the very first issue of this journal, they documented a community steadily consolidating its theoretical commitments and expanding its empirical reach. Over the following two decades, the journal published a growing body of scholarship punctuated by paradigmatic shifts arising from deepened understanding of learning and from technological advances. We characterize such paradigmatic shifts as waves. The rapid technological advances associated with Generative Artificial Intelligence (GenAI) could be interpreted as moving the CSCL field toward the crest of a new wave. We argue instead that it is a tsunami, a metaphor that captures both the scale and the destructive potential of what is arriving.

While CSCL has historically navigated successive technological shifts with scholarly care, the rapid ascendancy of GenAI into the public sphere represents far more than an iterative technological advancement. It is a departure from technology serving as a medium or scaffold for human interaction (Koschmann, 1996; Suthers, 2006). The current transformation challenges the core of the field by transitioning technology into a qualitatively different kind of agentic participant in collaborative inquiry. Where earlier CSCL technologies augmented the conditions for human meaning-making, GenAI now reproduces the outputs of knowledge construction at unprecedented scale and with remarkable fluency.

This critical juncture compels us to reflect on our fundamental values, define the ethics that we uphold, and consider how we can truly flourish as humans in an increasingly automated age. In the sections that

follow, we provide our perspective on the evolution of CSCL across the years as a series of waves, describe the force of the AI tsunami, and propose a framework intended to orient the field toward a more humanistic, justice-oriented, and planet-conscious future.

Part 1: Navigating the Historical Tides—The Three Waves of CSCL

To better understand CSCL values and practices and gain more perspective on the magnitude of this disruption, we first look backward, tracing the developmental trajectory of the field through the waves that carried us to this point. As Hoadley and Kali (2019) suggest, CSCL's foundational sociocultural worldview has evolved through iterative cycles of expanding understanding. We frame this history as three successive waves, a term that captures the cumulative progression of scholarly thought that has defined the field's maturation. Each wave expanded CSCL's unit of analysis and deepened its ethical commitments, moving the field steadily toward an axiological horizon. It was within this steady, if accelerating, progression that CSCL was beginning to find its ethical footing just as the AI tsunami disrupted the very waters we were navigating.

Wave 1: The Systems Wave—Mediation, Activity, and Group Cognition

The genesis of CSCL was defined by an analytical shift from the individual mind to the group as the primary unit of analysis. Grounded in sociocultural theory, this wave drew on the foundational work of Vygotsky (1978), Leont'ev (1984), and Engeström (1987), centering its analysis on mediated action, the ways in which cultural tools, signs, and technological artifacts scaffold mental functioning. Pioneers such as Koschmann (1996), Hutchins (1995), and Salomon (1993) explored distributed cognition, demonstrating that intelligence was not a solo possession but a systemic achievement accomplished through interaction with peers and technological affordances.

Stahl's (2006) foundational work deconstructed the mechanics of group cognition to reveal how meaning is co-constructed within a system, while Suthers (2006) investigated how the representational affordances of collaborative technologies shaped the intersubjective processes through which understanding is built and shared. Cress and Kimmerle (2008) extended this further with a systemic and cognitive account of collaborative knowledge construction as mutual adaptation between individuals and shared digital artifacts. Contributions like these expanded the field's capacity to describe how socio-technical features facilitate learning at individual, group, and community levels. Yet Wave 1 remained largely descriptive. It illuminated the system of distributed cognition while leaving relatively unexamined the deeper humanistic and ethical dimensions of the actors within the system.

Wave 2: The Humanistic Wave—Enculturation, Agency, and Creating Collective Knowledge

As the first wave was cresting, a second emerged, moving beyond the mechanics of distributed cognition toward a conceptualization of learning as enculturation. In this paradigm, learning was viewed not merely as a set of cognitive processes but as the transformation of participation in a community of practice (Lave & Wenger, 1991; Rogoff, 1990). This marked a significant humanistic turn by centering learning as becoming part of human cultures, with participation transformed through models and supports in the surrounding community and dependent on tools and practices.

This shift can be clearly seen in the well-known CSCL theory and model of Knowledge Building (KB), where classrooms become communities of authentic practice and students are enculturated into a disciplinary way of inquiry, such as that of scientists or historians (Scardamalia & Bereiter, 2003). Far from a purely technical framework, KB fostered epistemic agency and collective cognitive responsibility for public knowledge (Zhang et al., 2009). Central to it was the conviction that learners, including young children, could and should formulate the questions guiding inquiry rather than respond to teacher-directed tasks, surpassing themselves by connecting personal interests to community goals (Bereiter & Scardamalia, 1993). Responsibility for advancing shared knowledge rested with the community itself, and ideas were treated as improvable conceptual artifacts with a life beyond any individual mind. Technology was construed in kind. Rather than a management or content-delivery system, Knowledge Forum was conceived as a knowledge medium, a communal space for representing emergent subgoals and evolving community understanding, where rise-above notes let students synthesize diverse perspectives into higher-order conceptual integrations (Scardamalia, 2004).

Over time, CSCL has developed a rich ecosystem of collaborative learning environments that advanced our understanding of learning as enculturation, along with technologies supporting individual and collective epistemic agency and knowledge creation. Suthers and Weiner's (1995) Belvedere system pioneered computational support for collaborative argumentation and evidence evaluation, while the Web-based Inquiry Science Environment (WISE) translated inquiry-based principles into scalable web platforms for science education (Linn et al., 2003), and dialogue mapping tools such as Compendium supported collaborative sense-making around complex, ill-structured problems (Buckingham Shum & Okada, 2008). Work on collective regulation centered the development of socio-metacognitive expertise, supporting participants in evaluating and improving the quality of their own collaborative discourse over time (Borge et al., 2018), and data-exploration environments brought collaborative inquiry to bear on authentic data, as when young students working together with TinkerPlots developed informal inferential reasoning through explanation and attention to context (Gil & Ben-Zvi, 2011).

More recently, collaborative learning environments incorporating analytics dashboards and AI-augmented platforms have extended inquiry into hybrid human-machine epistemic communities, providing learners with real-time epistemic mirrors for reflecting on their own collective inquiry processes (Chen & Hong, 2016). Humanistic Knowledge Building Communities made the humanistic dimension of such work explicit through a model of double authenticity, keeping classroom practice congruent both with disciplinary modes of inquiry and with each learner's experience, history, and evolving sense of self (Authors, 2018; 2024). Each of these developments strengthened the humanistic

commitment to learners as genuine epistemic agents and to technology-supported collaborative learning environments as sites of authentic knowledge creation. Wave 2 thereby shifted CSCL decisively toward communities that put people at the center, so that as knowledge advanced, the humanity and agency of participants were fostered and protected alongside it.

Wave 3: The Sociopolitical Wave

Until the recent disruption, the field was slowly and unevenly entering a more reflexive Third Wave. It was marked less by settled consensus than by a gathering effort to confront questions the field had long deferred, questions that were beginning to unsettle its sense of identity in ways that remained open and, we would argue, generative (Järvelä & Rosé, 2023). A telling sign of this shift is that even a paper oriented primarily toward the theorization of collective thinking in dialogue closed by conceding that dialogue in education could no longer be conceived in abstraction from politics and power, and that CSCL stood at an important juncture in this respect (Baker et al., 2021).

The defining feature of this wave was the field's growing engagement with the sociopolitical turn that had come to reshape the broader Learning Sciences (Esmonde & Booker, 2017). This turn demanded that learning be viewed not as a neutral cognitive or cultural process but as one inherently embedded in power dynamics, historical legacies, and social struggle. Applied to CSCL, this meant interrogating who benefits from our designs, whose voices are systematically marginalized in collaborative settings, and whose knowledge norms our tools and scripts quietly encode. Concerns about equity, inclusion, and the structural reproduction of advantage through educational technology were becoming more central to the field's self-understanding and its evaluation of its own contributions.

Traces of these sociopolitical considerations were already visible in research from within the field. Slakmon and Schwarz (2014) directed analytic attention to disengaged students and to the question of how CSCL affordances might bring those positioned at the margins of classroom discourse into dialogic participation. Tchounikine (2019) went further, arguing for an explicitly emancipatory perspective on learners' agency in relation to CSCL technologies and thereby framing the design of collaborative environments as a matter of who controls the terms of participation. By the turn of the decade the concern had become explicit. Uttamchandani et al. (2020), writing in this journal, asked directly where equity belonged in CSCL and argued that ambitious collaborative learning practices should be understood as a lever for sustained and equitable educational change rather than as an innovation whose benefits accrue by default to those already advantaged. The 2021 International Handbook of CSCL devoted a chapter to interrogating the field's role in diversity, equity, and inclusion (Gomez et al., 2021). Other scholars later turned the question onto research practice itself, arguing that CSCL researchers should make explicit the visions of the good that underlie their design-based work so that the ethical commitments embedded in every intervention become an object of scholarly scrutiny (Authors, 2023). Taken together, these contributions suggest that the sociopolitical turn was not a proposal awaiting adoption but a conversation already underway, one in which the community was

negotiating its disciplinary identity and searching for CSCL's distinctive contribution to the axiological mandate the larger Learning Sciences had begun to embrace. That conversation was vital, still open, and unresolved when the disruption arrived.

The Collision: From Waves to Tsunami

This three-wave progression tells the story of a field coming of age through a natural, if accelerating, scholarly process. CSCL was learning to navigate the complexities of justice and identity with increasingly refined conceptual tools. Then the AI tsunami hit.

The tsunami metaphor is apt precisely because it describes a force that does not merely follow the previous waves but threatens to break over them entirely. The waves of the past shaped the field at a developmental pace that was fast but still allowed for adaptation and intentional scholarly response (Wise & Schwarz, 2017). The tsunami, by contrast, is characterized by a velocity that outstrips our capacity for measured reflection. Its danger is not necessarily total destruction, but the speed at which it carves a new landscape, often before the field has had time to adapt or guide its trajectory in a healthy direction.

While CSCL was already responding to the sociopolitical turn, the AI tsunami heightens the stakes to an existential level. The algorithmic forces now in play create a profound tension. On the one hand, there are opportunities for new forms of collaborative augmentation, including AI-mediated argumentation support, adaptive group formation, real-time epistemic analytics, and personalized scaffolding at scale (Cress & Kimmerle, 2023; Borge et al., 2024). On the other hand, there is an equal risk that these forces will flatten the human agency, collective wisdom, and plurality that decades of CSCL scholarship have painstakingly established. The tsunami does not permit the luxury of a twenty-year transition. It demands that we reconcile our identity crisis in real time.

Part 2: The AI Tsunami and the Radical Shift

Although we characterize AI as a tsunami, we are not rejecting AI as a collaborative partner. Instead, we insist that the design of AI-supported collaborative environments preserve, rather than circumvent, the productive friction of human meaning-making. We use this section to illustrate the kinds of issues the field will need to confront going forward, focusing on two that differ in scope. The first is specific to CSCL's own concerns, namely AI as a collaborative partner and its potential to flatten human experience, thought, and possibility in computer-supported collaboration itself. The second is far broader, namely the fast-moving developmental trends in AI that are reshaping society as a whole and that CSCL, therefore, cannot afford to ignore.

One challenge of AI in CSCL is that it risks acting as a flattener of human experience. A learner's voice, in the sense we intend here, is the recognizable imprint of a particular person on their contributions, the word choices shaped by their home language, the examples drawn from their lived experience, the

idiosyncratic framing that reveals how they, specifically, see a problem. GenAI, by design, works against this imprint. Because large language models generate the statistically most probable continuation of a text, their output tends toward a homogenized register that mutes the markers of the humans behind it. In collaborative settings, voice is how participants recognize one another as distinct thinkers and position themselves in a community, so its erosion can undermine the humanistic work that Wave 2 placed at the heart of learning.

The consequences run deeper still, and here we must be precise about what exactly is at risk, because it is plausible that AI-smoothed contributions would help groups advance their shared products faster. The risk lies not necessarily in the quality of the group's outputs but in the learning of its members, which CSCL has always understood as separable concerns. Intersubjective meaning making proceeds through participants noticing differences in how they understand a problem and working to resolve the discrepancies between them (Stahl, 2006; Suthers, 2006). It is this effortful negotiation, rather than the fluency of the resulting product, that builds individual and collective understanding, much as quick consensus building can produce agreement without the integration of perspectives that deeper learning requires (Weinberger & Fischer, 2006). Crucially, when AI polishes a contribution, it does not resolve the conceptual differences beneath it. Two learners may hold genuinely divergent understandings of a problem, yet if both understandings arrive expressed in the same articulate register, the surface signals of that divergence disappear, and the group proceeds under an illusion of shared understanding. The learners thus miss the learning opportunity that can arise from navigating, negotiating, and constructing shared understanding. The result is an environment in which discourse looks more polished than ever while the interactional engine of collaborative learning, the noticing, questioning, and repairing of difference, quietly stops turning.

In addition to the potential of AI to flatten human experience, it could also contribute to a flattening of thought. AI now outpaces human thought, and when learners rush toward its ready answers they offload the struggle and repair of meaning making that is essential for cognitive growth (Authors, 2012). The danger is most acute for those who have not yet developed critical and analytical frameworks of their own, for whom unquestioned use of AI can be cognitively numbing, leaving them never challenged in the ways that build deep thinking. This is why the field must attend to frameworks for critical engagement suited to an AI-saturated environment, such as the AI literacy framework jointly developed by the OECD and the European Commission, which places the critical evaluation of AI outputs alongside creating with, managing, and shaping these systems (OECD & European Commission, 2026). There is also the potential to flatten possibility, and these costs are invisible. Humans laugh, wonder, and make tangential connections drawn from what Kabat-Zinn (2013) memorably described as the "full catastrophe" of lived experience. It is often exactly such leaps, from a technical problem to a poetic nuance to a sensitivity toward a group's power structures, that produce genuine innovation. Yet, by habitually accepting the fast and fluent answer, we may be short-circuiting human ingenuity itself, and we will never know what we are missing.

Beyond these concerns internal to collaborative learning lies a second set of issues CSCL must confront, namely the fast-moving developmental trends in AI. These trends are societal in scale, yet each bears directly on the values the field has been grappling with. We consider three: the largely unacknowledged horizon of artificial general intelligence, the spread of AI into physical space through embodied robotics, and the environmental costs of the AI buildout. Individually, each unsettles some commitment the field holds dear; together, as we argue at the close of this section, they exert a convergent pressure CSCL cannot responsibly ignore.

The leading AI laboratories are not only building productivity tools, but have a clear agenda to build Artificial General Intelligence (AGI), systems designed to match or surpass human cognitive performance across all domains. This is an objective on which the founding charters and stated missions of OpenAI, Anthropic, and Google DeepMind converge (Mitchell, 2024). What is marketed as a writing assistant or tutoring companion is, in practice, the intermediate output of a research program oriented toward a qualitatively different intelligence, one that, if achieved, would not remain subordinate to human direction. Harari (2024) warns that such an intelligence, misaligned with human values or captured by narrow interests, could concentrate power in ways that render democratic governance and distributed human agency obsolete. The alignment problem remains unsolved, and the pace of capability development is outrunning that of safety research (Suleyman & Bhaskar, 2023). CSCL must therefore raise its sights beyond the design of ever more sophisticated tools and grapple with axiological issues including the trajectory, governance, and societal stakes of the intelligence these systems are becoming.

In addition, the tsunami is not confined to digital spaces. A new generation of AI-enabled robots, from Boston Dynamics' Atlas to Tesla's Optimus and the platforms built by Figure AI and 1X Technologies, is moving from laboratory demonstration to industrial and domestic deployment, performing not only cognitive but manual labor across healthcare, manufacturing, logistics, and caregiving. This embodied turn raises urgent questions for the field. What does collaborative learning mean where physical and digital agents co-inhabit the same workspace, and how do we design for human agency and equitable participation when AI is not a screen-based interlocutor but a co-present body? The tsunami is not merely sweeping through our screens; it is entering our rooms.

The third issue is that the AI buildout carries an enormous and growing demand for energy. In its 2024 electricity market report, the International Energy Agency estimated that data centres, the physical infrastructure underpinning AI, had consumed roughly 460 terawatt-hours in 2022, about 2% of global electricity demand, and projected that this figure could pass 1,000 terawatt-hours as AI workloads scale (IEA, 2024). The irony is severe: AI is frequently proposed as a tool for addressing climate change, yet its trajectory threatens to consume the very energy headroom a green transition requires. CSCL should not remain silent about the planetary costs of the technologies it studies.

We have named three risks, but the list will not hold still. Recent reporting describes general-purpose models supplying usable guidance toward the production of biological weapons (Dance, 2026), a convergence of artificial intelligence with biotechnology that Suleyman and Bhaskar (2023) treat as

among the defining risks of the coming decade, and some researchers now argue that the pursuit of superhuman systems is itself a gamble with human survival (Yudkowsky & Soares, 2025). Whatever one makes of the strongest of these claims, each month brings new candidates for the list, and a field concerned with how human beings learn together cannot treat them as somebody else's subject matter.

Taken together, these internal and external concerns constitute a convergent existential pressure on the values and practices that CSCL has spent twenty years developing, and they arrive in an environment already marked by misinformation, information warfare, and deepening social divisiveness. Rather than serving as a neutral arbiter, AI risks amplifying these fractures, empowering hegemonic corporate interests and further marginalizing vulnerable voices (Harari, 2024). The picture is sobering, but it is not a cause for despair, since naming the forces at work is the first step toward responding to them. The question that remains is what the field should do. In the final part of the paper we therefore turn to that constructive task, calling for a reorientation toward a humanistic, justice-oriented, and planet-conscious CSCL and sketching a framework and research agenda meant to preserve the irreducible messiness of human becoming while directing AI's transformative potential toward futures that are meaningful, just, and attentive to the planet.

Part 3: Toward a Humanistic, Justice-Oriented, and Planet-Conscious CSCL

The question before us is not whether AI will transform collaborative learning, because it already is doing so, but whether CSCL will shape that transformation or be swept along by it. We propose that the field's response be organized around three complementary commitments, taken up in turn below: a renewed and expanded humanism that insists on the irreducible value of human agency, authentic experience, and collective wisdom; an explicit orientation toward equity and justice; and a planetary mandate that widens the field's sense of what its work is about.

Expanding the Humanistic Commitment

The humanistic tradition views learning as not merely information processing, but a form of self-transformation that is inherently relational, embodied, and irreducibly human. CSCL carries real humanistic commitments, visible in a growing body of work in ijCSCL (e.g., Isohätälä et al., 2021; Authors, 2023), and it is this tradition that provides a response to a world where AI is ubiquitous. Yet we would overstate the case if we claimed these commitments are fully realized. The present moment should therefore be understood as an opportunity to foreground humanism in the field. In an era when AI can fluently simulate the products of collaborative knowledge work, CSCL must invest more heavily in the humanity that AI cannot replace and what, as we argued in Part 2, it threatens to flatten. This includes half-formed ideas whose roughness invites peers into joint sense-making, authentic disagreements where resolution demands social repair rather than instant synthesis, and productive

struggles (Kapur, 2024) through which real understanding is forged. These are not incidental features of collaboration. They are the very sites where learning happens.

Expanding the humanistic commitment also means taking the "human" in humanistic more seriously. Beyond cognition and discourse lie questions of meaning, purpose, and well-being, of helping people more fully actualize. Rogers (1961) described actualization as an innate, lifelong tendency to grow, develop, and reach one's full potential, and the actualizing person not as a finished state but as a fluid, evolving process of living, open to experience and free to create. For CSCL, this is not an imported concern. Human collaboration is a central medium through which actualization occurs, when it involves deep and active listening, empathy, mutual understanding, and the unconditional positive regard that allows each person to be seen and heard as fully as possible. The field could make a distinctive contribution by asking how computers can be designed to support that profoundly human process rather than substitute for it.

This expansion is urgent because the flattening of the human can occur without anyone deciding it. Of everything CSCL has achieved and aspires to, the humanistic dimension is the easiest to lose, because its erosion registers as convenience rather than as loss. The future direction we propose is therefore concrete. CSCL should treat meaning and purpose, human vulnerability, voice, struggle, and presence as explicit design values to be operationalized, studied, and defended in every AI-augmented collaborative environment the field builds. Doing this means developing the theoretical and methodological tools to detect their erosion before convenience conceals it.

Centering a Justice Orientation

The justice questions raised by GenAI are concrete. Large language models encode the linguistic, cultural, and epistemic norms of the data on which they are trained, and they reproduce those norms at scale (Bender et al., 2021). Learners from dominant language communities therefore encounter a mirror, while learners from marginalized communities often encounter a distorting lens that renders their ways of knowing invisible or invalid. Access to frontier AI tools is unevenly distributed across schools, regions, and socioeconomic groups, and the accompanying harms of surveillance, data extraction, and algorithmic misjudgment are distributed just as unevenly, extending the questions of fairness and bias that scholarship on educational data has begun to map (Uttamchandani et al., 2020). If the field does not address these harms, they will be absorbed into everyday educational practice as unremarkable features of the infrastructure.

In calling for this axiological shift, we are not advocating a solely critical stance. While we see the value in such critical refusal, we believe the field is better served by a middle ground. This position accepts the practical inevitability of AI in learning environments, works rigorously to address the specific harms it can cause, and then engages in deep design and research aimed at contributing to a more just world. Concretely, this means participatory design conducted with the communities most affected by these systems, empirical attention to the differential experiences of marginalized learners in AI-mediated

collaboration, and imaginative work on futures in which AI-augmented learning environments democratize epistemic authority rather than leave it in the hands of a few. A justice orientation, so conceived, can serve as a compass for CSCL's engagement with AI.

Assuming a Planetary Mandate

The third commitment concerns the scope within which the field understands its own work. By a planetary mandate we mean three things: the problems CSCL chooses to take on, the breadth of what it counts as technology, and the way it works alongside others. The last of these is vitally important, because a field that studies collaboration should be judged partly by how it collaborates.

The first is a matter of content. We would like to see more CSCL research take up the problems that matter most to humanity and the planet, beginning with global warming and ecological disaster and extending to the volatile, uncertain, complex, and ambiguous problems that characterize this moment. Such problems belong to no single discipline, and CSCL is well placed to support the interdisciplinary work they demand, asking how groups with heterogeneous expertise learn to think together about questions that admit no settled answer. This is not a call to abandon the field's established topics. It is a call for the field to be less neutral about which problems its designs and analyses ultimately serve.

The second concerns how widely we construe technology. When CSCL thinks about technology, it needs to look beyond the tool sitting with the group to the broader infrastructure and context that make its use possible (Authors, 2023). Author's (2006) social infrastructure framework underscored that design extends past the tool to the cultural beliefs, practices, and spatial arrangements that surround it. A planetary reading extends that argument further outward, to the material and political infrastructure on which collaborative learning now depends. The data centre question shows what such analysis requires. It would be simple, and simplistic, to oppose data centres solely on the grounds of ecological harm. The harm is real, and so is the fact that a route out of the ecological crisis runs partly through the technological innovation these facilities enable (Goldstein et al., 2019). Holding both truths at once, rather than resolving them into a slogan, is the analytic posture we advocate.

The third issue is processual. These problems are too large, too complex, and too consequential for the field to remain insular. By planetary we therefore also mean to widen and embrace our circle of care. These commitments, to human agency, to authentic collective inquiry, to justice, and to planetary responsibility, are shared by a constellation of allied communities working on different facets of the same challenge, namely how to preserve the conditions for human flourishing in a world being rapidly reshaped by algorithmic forces and ecological crisis. Among them are critical pedagogy (Freire, 1970), design justice (Costanza-Chock, 2020), human-centered computing, AI ethics, environmental education, and Indigenous knowledge communities defending radically different epistemologies of the human relationship to the natural world (Bang & Marin, 2015). None of these communities alone constitutes the movement that is needed. We do not write under the illusion that CSCL will save the world. We write with

the conviction that CSCL must do its part, which means both a clear-eyed account of what we distinctively contribute and a genuine willingness to be influenced in return.

What CSCL brings to such a coalition is specific and, we believe, indispensable, namely decades of hard-won understanding of how communities actually build knowledge together with technology, not in theory but in the messy, technology-mediated, socially complex reality of classrooms, out-of-school spaces, workplaces, and distributed networks. We know, empirically and through design research, what conditions support genuine collective cognitive responsibility, what kinds of tools foster rather than flatten epistemic agency, what it looks like when a community of diverse participants advances ideas that no one could have generated alone, and what is lost when technology is permitted to circumvent the productive friction of authentic inquiry. This calls for a particular disposition: a willingness to contribute without waiting for perfect conditions, to start locally with the communities we know, and to trust that rigorous humanistic and planetary work seeds itself outward. CSCL's own history is instructive. What began as an investigation of groups and classrooms has spread across universities, professional learning communities, and knowledge organizations worldwide, not through centralized dissemination but because generative ideas, when genuinely taken up and adapted by committed practitioners, create their own momentum. Realizing this vision will require the field to resist disciplinary insularity and to embrace a more expansive understanding of its identity and purpose. CSCL has historically defined itself by its methods, its technology platforms, and its theoretical commitments, and these remain important. To us, CSCL has always been about the question of how human beings, in all their cultural diversity and productive messiness, can use technology to think and grow together in ways that make the world more just, more knowing, and more livable. That question is not the property of any single discipline. It belongs to humanity and the planet as a whole, and in the age of the AI tsunami it has become urgent in ways that no field can address alone.

Conclusion: An Agenda for CSCL's Next Twenty Years

We close with a provisional agenda that follows directly from the three commitments above, oriented both toward rigorous internal scholarship and toward coalition with the broader movement just described. We call for research in three directions, one for each commitment.

First, in keeping with the humanistic commitment and with Part 2's argument that AI conceals rather than resolves conceptual difference, the field should develop robust empirical methods for assessing the quality of epistemic agency and the vitality of intersubjective negotiation in human–AI collaborative systems, and not merely the quality of the outputs those systems produce, and it should ask under what conditions AI augmentation supports rather than supplants the collective cognitive responsibility that Wave 2 established. Second, in keeping with the justice orientation, it should attend systematically to the differential experiences of marginalized learners in AI-mediated collaborative environments, where the harms of uneven access, surveillance, and algorithmic misjudgment accumulate, and it should engage those same communities in the participatory design of AI tools that encode humanistic values and honor cultural and linguistic diversity. Third, in keeping with the planetary mandate, it should contribute

to the public conversation about AI governance through the distinctive lens of collaborative learning science, cultivate partnerships with adjacent fields, among them design justice, AI ethics, environmental education, and critical pedagogy, and direct more of its work toward the complex planetary problems that no discipline can address alone.

The twenty years of ijCSCL represent a remarkable body of scholarship, one that has steadily expanded its analytical scope, deepened its ethical commitments, and developed increasingly sophisticated tools for understanding and supporting the human practice of collaborative knowledge construction. The AI tsunami does not render this legacy obsolete. It makes our work more urgent. What the moment asks of the field is not a new technology of collaboration but a clearer account of what collaboration is for: the humanity that AI can simulate but not live, the justice that technology can either interrupt or entrench, and the planet on which all of our learning finally depends. The task now is to carry the insights of three developmental waves into conditions that are fundamentally new, and to do so not in isolation but as part of a larger, parallel, and genuinely planetary movement. This is, we believe, what CSCL has always been reaching toward, and what the next twenty years demand that we become.

Declarations

Author Contribution

Y.H., S.K., and K.B. contributed to the conception, writing, and revision of this manuscript. All three authors were involved collaboratively throughout the entire process, from initial conceptualization and literature review through drafting and editing. All authors reviewed and approved the final manuscript.

Ethics Statement

The authors declare that no funding was received for conducting this study. The authors have no relevant financial or non-financial interests to disclose. Ethics approval was not required because this research did not involve data collection on human participants.

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