Discursive principles for human-technology collectives

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Abstract

To be human is to think collectively with other humans, animals, technologies, objects, and environments. I argue that current discourse around technology and education is impeded by three main conceptual divides: between individual and collective understandings of thinking and learning; between humans and technology; and between AI and other technologies. I propose that crossing these divides involves a discursive shift away from framing humans and technologies as separate entities, toward a framing of collective, dynamic, entangled social, material, and digital activity that recognises that all human thinking involves collective human-technology relations. I offer five principles of collective thinking and learning: distribution; complementarity; co-constitutive multiplicity; integration; and attuned diversity. I then use these as a basis for considering what it means to educate for collective intelligence.

Introduction

The intersection of artificial intelligence (AI) and collective intelligence is fertile ground for education. Understanding AI technologies as things we think with, rather than things that think for us, or that dehumanise us, or that supercharge us, seems to me to be the most promising path through this terrain. I see three main conceptual divides that form obstacles to this pathway: between individual and collective understandings of thinking and learning; between humans and technology; and between AI and other technologies. I propose that crossing these divides involves a discursive shift away from framing humans and technologies as separate entities, toward a holistic framing of collective, dynamic, entangled social, material, and digital activity.

To be human is to think collectively with other humans, animals, technologies, objects, and environments (Sutton, 2010). This is the case, even when it seems we are alone. The social and material world is always there, shaping our thoughts as we shape it in return. As well as other humans, our collective intelligence involves, and has always involved, a wide range of technologies, including smart devices, computers, calculators, books, chairs, cave paintings, and so on. Human intelligence and human learning are not distinct phenomena that exist outside of technology. In fact, engagement in the production and integration of technology is fundamentally human (Donald, 1991), and humans have played a key role in creating the very concerns that so often prompt calls for the preservation of "the human" within education (mostly by avoiding or bracketing out technologies).

Further, AI, or any technology, does not necessitate a paradigm shift or a fundamentally new way of thinking. In part, this is because we are never actually dealing with one technology in isolation but multiple instantiations that are assembled (Dron, 2023) and integrated into situated practices. In other words, my ChatGPT is not the same as your ChatGPT due to how and why I use it, the conditions in which I use it, and the way it is configured and assembled with other technologies such as computer, broadband, web browser, word processor, library, VLE, desk, and so on. Treating AI not as a special category but as a suite of specific, instantiated technologies (admittedly, very interesting and complicated ones) that are integrated with non-AI technologies into collective thinking, can help us to resist the hype that often pervades AI discourse. This, in turn, can support a more precise understanding of risks and possibilities, help us to examine past, present, and future technological developments, and highlight valuable questions that we should have asked about previous technologies and practices.

To help us cross these divides and commit to a more holistic and integrated view of AI within collective intelligence, I propose some general principles of collective thinking and learning:

Distribution: Thinking and learning are done by holistic combinations of people and technologies (or "*human-technology collectives*"), not by individual entities. Sociotechnical systems (Hutchins, 1995), technological *assemblies* (Dron, 2023) and sociomaterial *assemblages* (Fenwick et al., 2011) are different ways of describing these kinds of collectives from different epistemological positions. Each conception has different ways of defining what is involved in a collective and how we might understand the relations between them, but in each, the unit of analysis (the thing that does the thinking) is not the individual human or individual technology but the broader collective. Such collectives have "cognitive properties in their own right that cannot be reduced to the cognitive properties of individual persons" (Hutchins, 1995, p. 266). This also means that there is no "human intelligence" that is distinct from engagement with technology. "Individual" learning is necessary to collective function by supporting adaptive configuration of, and integration into distributed systems, but this learning is inextricably entangled in collectives. Thus, collective intelligence is partially contingent on *entangled, collectively-attuned individual intelligences*.

Complementarity: Different elements that are integrated into collectives contribute qualitatively different cognitive processes and functions. This principle can help us to recognise important differences between humans and technologies and avoid attributing equivalent functions to them (Sutton, 2010). This, in turn, can help us to move beyond unproductive comparisons of human and technological capabilities (e.g. where we imagine human capabilities in computational terms or imagine technological capabilities in human terms) and avoid reductive, deterministic, instrumental, and/or inherently pessimistic or optimistic formulations of problems (e.g. replacement, dependency, offloading) and possibilities (e.g. optimisation, techno-solutionism). This does not mean that different elements always complement each other – they can also be contradictory (e.g. my sat nav might tell me to go a way I know is wrong). Rather, it means that they are doing different things. For example, I remember, navigate by landmarks and signs, and make decisions about

what to do next while my sat nav calculates and predicts a full route for my consideration, offers instructions, and recalculates according to new GPS information.

Co-constitutive multiplicity: Individual and collective thinking and learning co-constitute each other. An individual learns to think collectively, not just through individual "collective thinking skills" but through collective practices. Individual thinking and learning are seen as contributing to (and manifesting within) collective thinking and learning, and vice versa. Learning to be a pilot is, in part, learning to think with an aeroplane, including its component technologies, and other people who contribute to its safe and effective navigation (Hutchins, 1995). As those technologies change, pilots must learn to integrate into changing human-technology collectives and, in turn, to integrate technologies into their collective practices.

Integration: Individuals do not simply "use tools" but integrate themselves and technologies into dynamic human-technology collectives in which other elements are already entangled. This requires a combination of individual and collective learning. This principle acknowledges that technologies are always context-dependent assemblies of multiple other technologies (Dron, 2023) and cannot operate in isolation of these broader assemblies.

Attuned diversity: People develop different collective thinking practices with a range of other people, objects, technologies and environments. These different ways are not right or wrong but are attuned to different contexts, conditions and characteristics as part of personal "cognitive niches" or configurations (Sutton, 2020).

Educating for collective intelligence

Learning looks different through a collective lens, and the principles above suggest some implications and questions for education. Crucially, diverse contributions within collectives can allow them to do more than individual constituent elements could. Therefore, rather than measuring how well each student does the same thing, we might observe, over a longer period of time, how different students contribute to, or participate in, collectives in complementary ways, and how they use their agency to configure and shape those collectives.

Taking an example from medical education, trainees on clinical placement do not simply conduct tasks with a certain level of competence. They also support and enable collective functioning through, for instance, facilitating the flow of movement through a ward or corridor, modelling compassionate communication with patients and colleagues, completion of paperwork in a way that is meaningful to others, or through appropriate, critical and ethical engagement with technologies and systems. Assessing such contributions, although it might be augmented by conversation and reflective accounts, would centre around thoughtful observation, which looks for things that are less visible if we focus on individuals as autonomous, independent beings (e.g. relations between peers, or subtle ways of making different parts of a system work well together).

A second example is group work. Educating for collective intelligence requires a shift away from traditional ways of assessing group work in terms of proportional contribution of autonomous individuals. We would not try to extract and quantify individual contribution, but instead analyse the relations between individuals and other elements within collective group activity. How an individual relates to other people and technologies shapes the cohesion, direction and productivity of the group. How does a learner create space for others to act, how do they materially signal or structure the kinds of actions others might take, how do they align uses of technology with the shared values of the group, how do they facilitate group action through an alternative perspective or by feeding in an idea at the right moment? These are potentially valuable contributions to a collective. However, it is not that one contribution is greater than another; contributions to collective activity are understood as relational; as part of an evolving, responsive attunement to situations and to the goals of the collective.

A third example involves seeing traditionally individual activities as collective. Writing an essay, for example, involves past and present collective intelligence. Writing is a form of collective thinking in that the media used (pens and paper, or keyboards, computers and software) are integrated into mental activity such that they play a part in shaping thoughts and ideas (Clark, 2008). Further, this activity involves building on previous work by other authors, talking and learning with educators, peers, parents, and others, and integrating technologies into writing practices, such as word processors, search engines, journal databases, virtual learning environments, and AI chatbots. These practices are of as much interest from a collective intelligence perspective as the essay itself, because they can tell us about how thinking is distributed across elements. Helping students to learn to think and work collectively, across different situations, is the crux of educating for collective intelligence.

To assess collective intelligence, we would observe how individuals adapt across diverse contexts and teams, rather than in isolated moments (e.g. across different medical situations, teams and clinical placements; or across group projects with different groupings, topics, tasks, and technologies; or across a range of ostensibly individual tasks in different conditions). Through a varied sampling of groups, situations, tasks and purposes, the focus would be on how learners develop complementary roles and relations over time within different groups and settings, demonstrating their ability to both influence and be influenced by various collectives.

Designing and enacting such assessments might help us explore the ways in which individual learning is also collective, and how collective learning involves coordinated individual attunement. For this to be feasible, educators will need to support students to learn to attune practices across a range of conditions and contexts, and assessment will need to evolve to recognise distributed contributions rather than only individual ones. This might align better with complex societal and educational challenges that are too much for individuals to address in isolation.

While there may always be times that we want to isolate students from particular technologies for particular educational purposes, claims that this leads to students "doing the learning themselves" or showing "what they actually know" are imprecise. There is always technology involved (e.g. an invigilated MCQ exam involves paper, pens, desks, clocks, the exam script itself) that shapes what a student thinks and does, according to the particular integration of student and technology (have they learned to operate effectively in such a collective?). In this sense, assessment performances are always collective and distributed. A more precise claim is that we impose specific conditions and restrictions on the student's performance. Educationally, we might then ask how students configure or attune their practices to suit such restricted performances, and the extent to which this is helpful to their attunement of practices to future contexts.

Similarly, calls for assessment to target "human learning" are imprecise, since learning to use AI is a form of human learning. There is no pure, morally-superior human intelligence that can be extracted from human-technology collectives. Indeed, it may not be "humanness" that we want to support (humans are not inherently good) but something else—potentially diverse values that we feel are being threatened. If we can identify these values, they can inform the ways in which we configure, shape and – through our practices – integrate into collectives that involve technologies.

A strong commitment to a collective, holistic and integrated view of how humans engage with technology can help us see things that are invisible to an individualistic lens. As discussed above, it can help us to more precisely formulate goals, concerns, risks and productive possibilities. While agency is always constrained and relational (we can't do whatever we want because we are tied to other things and must act in combination with them), there are more ways in which we can exert that agency, directly and indirectly, to effect change (e.g. by engaging with additional people or technologies).

Collective intelligence is undoubtedly a valuable concept for reorienting educational practices towards productive, responsible and ethical integration of AI. However, the potential of collective intelligence extends beyond merely designing methods or technologies to promote particular instances of its application. I call for a more fundamental discursive shift - one that recognises that all human thinking involves collective human-technology relations. The principles above provide a conceptual basis upon which to build this discursive shift. I argue that viewing all technology as integral to collective thinking and learning helps us to be more precise in articulating the goals, values, risks and possibilities of integrating technology into education. As such, AI technologies are potential things to think with, along with a wide range of other people, objects, technologies and environments that students encounter in formal and informal educational settings.

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