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ARTICLE



What is the machine? Teachers' professional learning about generative artificial intelligence as tutors for children

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ABSTRACT

With the introduction of artificial intelligence (AI), particularly Generative AI (GenAI) to school settings, teachers are likely to be drawn into professional learning scenarios where they will be expected to learn how to use programs and applications for remediation and tutoring of children. Previous research highlights how professional learning for teachers about GenAI has been focused on gaining their acquiescence to using GenAI by arguing that it is both superior and inescapable. This critical posthuman work uses a professional learning scenario to ask questions about the historically present challenges of asking teachers to use GenAI as a *universal good* when this discourse has been used to colonise and imperialise in schools, particularly with technologies. Our critical posthuman diffractive reading revealed alternative encounters that teachers and students could have with GenAI and reasonable pathways for avoiding it. Implications of this work include a need to draw on the diffractive encounters presented here to understand and address who and what the machine is when it comes to adopting advanced technologies for various purposes in schools.

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Educators are tasked with being and becoming within an increasingly complex assemblage for their profession (Mulcahy 2011). Such an assemblage includes application programs developed through machine learning and algorithms that are commonly called Artificial Intelligence (AI) (Rillig *et al.* 2023). AI includes Chatbots and Large Language Models (LLM), which have a complex mathematical architecture and have been trained using billions of words using natural language processing (Rillig *et al.* 2023). LLMs and Chatbots respond to user input and provide algorithmically generated outputs based on prompts that simulate conversation. Language translation and transcriptions of audio can also be achieved in this way (Rillig *et al.* 2023). In late 2022, the Generative Pretrained Transformer language (GPT) that produced communication closely resembling person-to-person dialogue came into public use (Rillig *et al.* 2023). Generative Artificial Intelligence (GenAI) is a term for programs and applications that use LLMs with GPT language (Hodges and Kirschner 2024). The pedagogical implications of GenAI technologies are speculative (Lim and Nicolaides 2024).

GenAI was not intended for education alone; it was pushed into multiple fields and disciplines and has been the subject of government and international inquiry. The United Nations Chief Executives Board for Coordination deliberated the ethical use of multiple forms of AI in 2022. The commission identified children rights to personal privacy and stated a need to revise internal procedures for data collection in government systems, including schools. Key directives from the

commission regarding AI included the injunction to do no harm, provide clarity of purpose, ensure safety and security, practice fairness and non-discrimination, aim for environmental sustainability, preserve privacy rights, honour human autonomy, be transparent and forthright in explanations to constituents, practice responsibility and accountability, and invite participation using inclusive approaches to AI use (United Nations System, Chief Executives Board for Coordination 2022).

The infusion GenAI into education in the United States and in other countries required school leaders to decide how to provide professional learning to teachers about GenAI alongside other forms of AI when neither teachers nor leaders had familiarity or technical expertise (Bower *et al.* 2024). When US President Joe Biden released an executive order with mandates for ethical AI in October 2023, the effort was primarily aimed at protecting business and military interests. For schools, there was a vague call to use AI to personalise learning:

Shape AI's potential to transform education by creating resources to support educators deploying AI-enabled educational tools, such as personalized tutoring in schools. (The White House 2023, emphasis in the original)

Discourses for *personalized learning* in US educational parlance are a common refrain for educational technology vendors. The use of the term has been criticised for being more focused on capitalism than student learning (Arnesen *et al.* 2019, Boninger *et al.* 2019). While it is true that executive orders in the US government are among the weaker methods for making policy at the national level, this initial order offers insight into federal policy priorities and the deference that is afforded to educational technologies in US schools.

The infusion of GenAI in schools also came amid a host of unresolved and largely unaddressed tensions in school systems around historically present inequities (Brayboy 2005, Mills 1997, Calderón *et al.* 2012). Racism is a technology. Racism uses technologies to ensure that inequities can persist, with minimal to no challenges (Benjamin 2019). Racism permeates the discourse of technological uptake where teachers have been required to use other technologies as universal goods in the name of economic and social progress (Knox 2013). The call for *universal goods for universal progress* has been used to colonise, erase local and indigenous knowledges, and justify environmental degradation (Mills 1997).

Universalist policy has been particularly devastating to those who have been Black(end) to gain access to their labour and/or who have been otherwise displaced and (de)humanised because their land was needed for *progress* (Smith *et al.* 2012). The historically present effects are that children from excluded groups and/or who have physical, cognitive, or other differences with implications for their learning are positioned as having deficits within educational spaces by the very technologies that are handed to teachers to serve them (Morris 2020, Ricaurte *et al.* 2024). For many communities, there is also a pressing existential threat in the loss of lands that become *ghosts* and/or the poisoning of the land into *monsters* through technological damage and waste associated with GenAI and related technologies (Tsing *et al.* 2017).

Because text generation is a primary function of GenAI, its use to support writing in education settings garnered attention (Brassington *et al.* 2024). Recent studies of GenAI for teachers' professional learning reflect its imposition as a requirement unless and until they acquiesce. Kaplan-Rakowski *et al.* (2023) surveyed teacher interest for using GenAI and found that the more teachers used it, the more amenable they were to use it more often. Similarly, Baidoo-Anu and Ansah (2023) found that teachers in Ghana hesitated to use GenAI but were persuaded to do so because they were convinced to regard GenAI as inevitable as part of professional learning. Similarly, prospective teachers in China were more positive about learning mathematical concepts when using GenAI than traditional methods because of a sense that technology is universally an advancement (Lu *et al.* 2024). In Israel, Nazaretsky *et al.* (2022) argued it was important to gain teachers' trust by sharing how GenAI worked. What the researchers meant by *how AI worked* was to convince teachers during professional learning that the AI graders' judgement was better than theirs. Finally, Velandar *et al.* (2024) worried that teachers' emotional responses would complicate the ability of schools to impose

GenAI for teaching. In these studies, the inevitability of GenAI for economic and social progress was touted as universally superior and universally necessary.

Professional learning for teachers in the US and other countries has been especially likely to respond to interests of economic and social profit; GenAI has even been described as key for employment prospects for teachers, job skills for students, and part of keeping current in society (Bower *et al.* 2024). It is unclear how the United Nations System, Chief Executives Board for Coordination (2022) principles of ethics, privacy, and protection for people and environment could play a role or how seriously that role would be taken considering the host of extant unaddressed issues of equity in schools globally. While it is possible to conceptualise the use of advanced technologies within local realities, such as land/water, and not assume deficit perspectives for children and communities, to do so would require considerable reimagining and (re)narrating to move beyond universalising influences (Rice and Argüello de Jesús 2024).

For this paper, we drew on critical posthumanist thinking to create a space for multiple possibilities through diffraction (Barad 2007). This activity explored emerging issues for teachers' professional learning about students positioned as needing GenAI tutoring. To share this work, we first elaborate on our understanding of colonialist structures in schools. Then we outline the posthumanist ways of knowing that supported our thinking about how GenAI would be used for professional learning. Next, we present an Assemblage-as-Narrative that we co-constructed. We learned from it using diffraction as *reading-through* to understand possible responses to the Assemblage-as-Narrative. We end by sharing key learnings along with wonderings about research and practice.

Conceptual framing

The conceptual framing for this work has two major sections. The first section critically positions US schools by explaining how the so-called neutrality in school spaces reflects a long-standing racial social contract that relies on leaving some groups (de)humanised (e.g. Mills 1997). The second part moves to the posthumanist explanations that guided this work as situated in technofeminism (e.g. Barad 2007). These explanations demonstrated how we disoriented the hierarchies between Beings and instead, framed these relationships as entanglements between humans and (non)humans to do our diffractive exercise.

Critically framing school settings

We trace our critical position regarding US schooling through the social contract that early US colonial governing entities agreed to, and which has persisted to current times (Mills 1997). The contract was stratified politically and socially based on race and gender, named property holders and what constituted property, and then guarded by merging it with the local moral code so that all behaviours could be strictly regulated (Mills 1997). The contract functioned as a series of individual (in)formal (meta)agreements whereby non-White peoples were designated to have inferior social and moral status (Mills 1997). This status emerged as a *Chain of Being* where Man was at the top, followed by animals, and then stones – or things which were not living (Jackson 2020). Crucial to the Chain of Being was that the designation of Man was exclusive to White-ness. As Mills (1997) wrote, 'when they wrote justice, they meant *just us*' (p. 110).

As Man, White peoples could arrange systems to dominate and maintain power over non-White peoples through labels that connotated less human-ness, such as *beast* or *savage* (Jackson 2020). The racial and ethnic stratification has been maintained through elaborate myths – as well as terms and labels – disguised in institutions as colorblind ideology (Carr 1997, Bonilla-Silva 2021). Both overt and subtle forms of racism continue through institutionalised values that rely on such universalism, along with naming others as inferior, while denying that privilege exists (Mohanty 2003, Brayboy 2005, Arvin *et al.* 2013).

The universalism that emanates from the social contract within institutions advances imperialist goals of consumerism, competition, rationalism, detachment, individualism, and narcissism; in turn, ecological philosophy and consciousness in schools is impeded (Cajete 2000). It is difficult to question historically present abusive relationships with lands/water when prioritising technological integration (Wall Kimmerer 2013). Moreover, Western science is often presented as abstraction that psychologically disassociates people from nature (Cajete 2000, Wall Kimmerer 2013). Although US educational systems have been dismissive of land/water/body connections, they have also invested huge financial resources in removing Indigenous children from their families to steal land (Haaland and Newland 2022). These histories of dispossession position GenAI within a complex chaos that, if not well-considered, could be yet another so-called *universal good* for *universal progress* from which harmed groups must survive and heal (Forbes 2008, Wall Kimmerer 2013). Thus, while forging a Chain of Being where humans, animals, and stones (i.e. (non)living) was intended to Black(en) some individuals and justify violence against even more peoples, we take a view where human, plant, animal, and spirit hold possibilities for mutual reciprocities (Cajete 2000). There are not unlimited (non)human resources for technological output for humans. There are not unlimited humans as resources.

Posthumanism

The post-human project rejects Man. Many contemporary feminisms (e.g. ecofeminism) have already rejected the right of Man to access the bodies of all living entities (Braidotti 2019). This tradition aligns with techno-teratological thinking (Kristeva 1980, Barr 1987, Haraway 1992, Braidotti 2002, Creed 1993). Such alliances coalesced around solidarities of women – or others of ‘Man’ – and non-humans (animals, insects, plants, trees, viruses, fungi, bacteria and technol (Biological automata)) (Braidotti 2019, p. 39). However, there is more to be done than reject the hierarchy between Man and (non)human; we must critically engage with what it means *to Be* in any biopolitical context (Mohanty 2003, Jackson 2020). There is not just a crisis of what it means to be a human, but there is a ‘failed praxis of being’ (Jackson 2020, p. 15). To understand *Being* or more accurately in post-human thinking, *Becoming*, two principles – intra-active entanglement and diffraction are useful.

Intra-active entanglement

Posthumanism carries a relational understanding of events and ideas as being intra-actively entangled (Barad 2007). Such relationality means that all being and doing affects other matter (Cajete 2000). Hierarchy or linearity are absent in such on-going becoming. Therefore, finding directionality for power is not useful; we also must think about what the power is doing – like ripples in a pond when a stone is thrown in. Because power has no direction and structure, terms like *oppression* and *resistance* are both *affect*, or ways of becoming.

Diffraction

Diffraction supports our understanding of Becoming. As an ocular metaphor, diffraction differs from reflection in that it does not require an exact replica. Diffraction prefers differences – ripples – materialities that have effects that can be seen (Fox and Allred 2017). Differences might also be thought of as manifestations or animations of spirit (Cajete 2000). To think diffractively instead of reflectively, readers engage multiple discourses simultaneously (Merten 2021). Discourse can emerge from words, the typical linguistic discourse, as well as through visualisation and sound as creative acts. We wanted to experience ourselves as being involved a phenomenon and consider how our attention to it as researchers were part of the entanglement that shifts both our becomings and the becomings of other materialities. The goal of diffraction is to gain insight and learn to think about materialities (i.e. differences that make a difference), their relationships, and experience interconnectedness (Cajete 2000).

Methodology

Our research design assumed an intra-active relationship between ourselves and the phenomenon of professional learning about GenAI amid a complicated assemblage (Barad 1996). We engaged moved from epistemological positions towards understandings about the relationships of things in the world (Fox and Allred 2017). The work of engaging together resulted in the entangled, inwoven becomings (Cajete 2000, Wall Kimmerer 2013).

Assemblage-as-narrative

To initiate this work, we captured an assemblage of considerations that we wanted to discuss as a narrative. Considerations emerged from research about GenAI and professional learning alongside practical concerns from living in our communities as teachers, teacher educators, and staff developers. Precedent for emblematic narratives in research exists (Mishler 1990). Scholars like Bullough and Pinnegar (2001) developed guidelines for using autobiography to identify new insights about research. Clandinin and Connelly (1986) and Clandinin (1989) also used teachers' stories as professional knowledge. Within narrative inquiry methodology, conceptualised fictionalisation techniques to combine narratives, increase salience, and preserve privacy and confidentiality in research (Caine et al. 2017). Using these techniques and guidelines, we assembled a story about ourselves that included personal practical knowledge(s) so that we could then draw it out again diffractively using a multiplicity of theories and thinking tools. In this way, we drew on local places and epistemologies to allow a story to *find us* amid our inquiry (Cajete 2000, Wall Kimmerer 2013).

Such an Assemblage-as-narrative consisted of bodies and abstractions that were caught up in a moment of social inquiry (Fox and Allred 2017). In this case, that social inquiry was professional learning about GenAI for schoolteachers. The critical elements of this Assemblage-as-story were:

Central administration—able gaze (special educational services)—monolingualism—writing instruction—required professional development sessions—GenAI as a solution.

Once we had developed the Assemblage-as-narrative, we set to tracing.

Doing diffractive tracings

For analysis, we engaged in a process of diffractive tracing (Barad 2007). For tracing, it was important to consider what other theories and theorists we wanted to think *with*. In thinking *with*, we are not engaging in a comparison, but rather setting up a relationship between texts where insights come from using language from various thinkers to yield interesting ideas. The theories and ideas for thinking *with* were selected based on their differences from one another in space and time and in sharing borders with, but also being distinct from the criticalities that we described at the beginning of the paper. By drawing on various theories, we were able to create space for diffractive knowings and be subject to vulnerabilities that come with collective sense-making. Four researchers wrote an initial response to the Assemblage-as-Narrative and then received responses from the lead author with reference to the critical posthuman framing. The four types of theories were (1) linguistic positioning theories (2) critical humanism (3) radical polemics, and (4) community-engaged praxis. As a group, we used language and terms from each other's responses to make connections by placing words in proximity to one another. Figure 1 contains an example from reading Assemblage-as-Narrative through positioning theories where we were working with foundational ideas from Wittgenstein *et al.* (2009).

We recognise that the report of a hybrid assemblage is an affect economy; researchers become during the work. We acknowledge our roles in the machine of this research (Fox and Allred 2017). Further, we understand that the conception, activity, writing and representation of this work varies from traditional research papers; we did this deliberately to

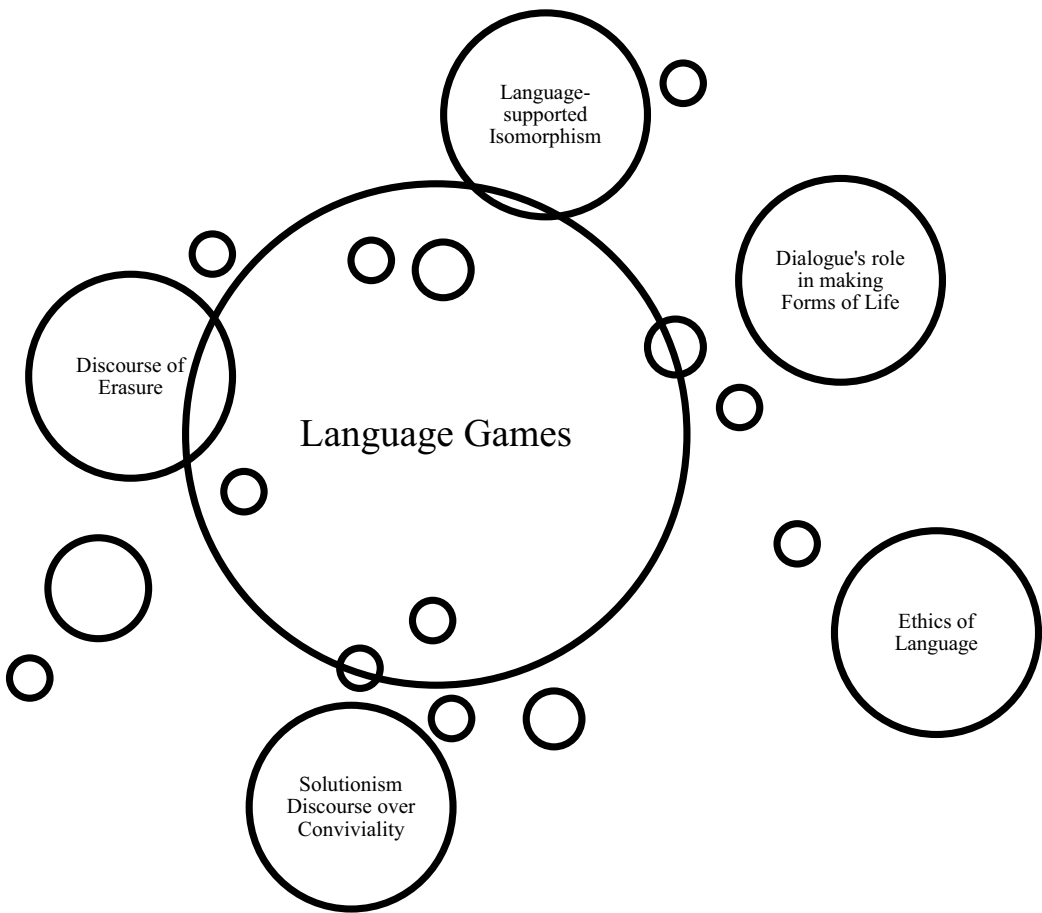


Figure 1. Diffractive tracing example.

challenge how research is conceptualised for publication. We do not misunderstand how research *is supposed to look*. We point to previously published work in this journal by Strom (2021) and others as examples of such variation in posthuman, and new/neo-material framing.

Diffractively Reading-Through Assemblage-as-Narrative

Below is the Assemblage-as-Narrative that we developed. Then, we present four perspectives. In the discussion section, we create a new assemblage of ideas from the diffractive process.

Central administration recently announced a new initiative to support secondary student writing development that will begin next week. 'This exciting new program will focus on students identified with special educational needs and students who speak languages other than English or forms of English that are less preferred by our valued local employers. To make the most efficient use of your precious instructional time, Artificial Intelligence tools (AI) will be used to provide feedback on student writing. All teachers are required to four attend professional learning sessions about (1) what standardized essay prompts to give students, (2) how to use AI prompt engineering to elicit feedback for students, (3) how to evaluate the quality of feedback on students' essays and what to require students to address, (4) and how to use AI detection software to decide when students are using AI to write their compositions. We look forward to learning with you!'

Diffracting through positioning theories

The first set of theories we considered focused on linguistic positioning. Schools are massive bureaucratic machines, ‘highly structured organizational fields . . . in which individual efforts to deal rationally with uncertainty and constraint often lead, in the aggregate, to homogeneity in structure, culture, and output’ (DiMaggio and Powell 1983, p. 147). The preference for conformity does not occur because it makes institutions more efficient, but because of political influence, uncertainty in technology and/or environment, and professionalisation (DiMaggio and Powell 1983). As current concerns about test score improvements and market competitiveness become political imperatives, technology developers offer solutions to problems. Decisions to use GenAI ‘involve managerial behaviors at the level of taken-for-granted assumptions rather than consciously strategic choice’ (DiMaggio and Powell 1983, p. 149). Positioning theory and Wittgenstein’s *et al.* (2009) concepts of ‘language-games,’ can bring new insights.

The term *language-game* describes how ‘the *speaking* of language is part of an activity, or of a form of life,’ which includes, ‘[g]iving orders, or acting on them . . . [r]eporting an event . . . [g]uessing riddles,’ among others (Wittgenstein *et al.* 2009, p. 15). Games suggest rules, but rather than seeking rules, we should ‘see a complicated network of similarities overlapping and crisscrossing: similarities in the large and in the small’ (Wittgenstein *et al.* 2009, p. 36). Word meanings depend on the games in which they are used and the rules of those games. Thus, a *form of life* is the culture or aspect of living a group takes on, and the linguistic forms used to describe and prescribe it. These forms of life provide the ‘judgements that [are] required for communication by means of language’ (Wittgenstein *et al.* 2009, p. 94). Forms of life that groups assume are, in part, an ethic that positions them in relation to various moral orders. Schools are sites for such complex language-games. Since rules are open to interpretation, social practices embody rules. In the Assemblage-as-Narrative, *central administration* and the *valued local employers* are social formations that matter. The central administration defined the social practices, while teachers were simultaneously ordered and cozened to uncritically accept GenAI into teaching practices.

Building on Wittgenstein’s *et al.* (2009) concept of language-games, positioning theory offers deeper considerations of implicit and explicit power relations. Positioning ‘is the discursive process whereby selves are located in conversations as observably and subjectively coherent participants in jointly produced storylines’ (Davies and Harré 1990, p. 48). Because ‘[a] conversation unfolds through the joint action of all participants as they make – or attempt to make – their own and each other’s actions socially determinate’ (Davies and Harré 1990, pp. 45–46), conversations flow to and from the personal to the cultural, and through discourse to create ‘overlapping moral orders’ which ‘can be regarded as sets of rights and duties created by declarations with deontic powers’ (van Langenhove 2017, p. 4). Thus, ‘all social structures can be regarded as moral orders that set out the rules for appropriate behavior,’ and ‘constitute the invisible moral space that surrounds people at all times’ (van Langenhove 2017, p. 3, 6).

The Assemblage-as-Narrative represents several moral orders that positioned teachers and students in ways that denies them agency and installed GenAI as arbiters of their relationships. In the first two sentences, the new initiative is described as *exciting* and acknowledges teachers’ *precious instructional time*, positing the use of GenAI as a benefit for teachers. However, the fact that GenAI *will* be used, and the requirement that is established for all teachers to attend professional learning on the implementation of GenAI, positions teachers as duty-bound to accept use and required training without question. Students’ forms of life are positioned as deficient with a need to be corrected in line with the preferences of the *valued local employers*. The institutional moral order of the school, the established language-games formed already, the relationships and ways of interacting that teachers and students have already developed to facilitate learning, collide with the ethic of capitalism, where students are positioned for their value as future workers; students’ own desires are subsumed in implicit duties to adopt forms of life that satisfy those they hope will hire them later (van Langenhove 2017).

The topics of the four required professional learning sessions positioned teachers and students in opposition to one another under an ethic of simplifying the learning process. The standardised prompts of the first session position teachers as test proctors whose professional knowledge of their students is irrelevant. Students are positioned as passive patients being administered a remedy. The second and third sessions position teachers as GenAI functionaries who mediate between GenAI and students. Again, teacher expertise is positioned as beneath GenAI, and as part of the imperative to meet the needs of local employers, with an added absurdity. Instead of responding directly to students, teachers instead administer feedback provided by GenAI. In another absurdity, the fourth session positions teachers as policers of student GenAI use through use of AI detection software, even though GenAI has been used to engineer prompts and evaluate student writing. While GenAI are positioned as a relief to teacher workload, they create more teacher work and position students for inevitable punishment. Instead of facilitating an ethical relationship between teachers and students, GenAI – as intended to be implemented by the district – create an antagonistic relationship. Further, central administration may be adopting GenAI without first learning how GenAI works or considering the range of ethical implications. Overall, the language game of this Assemblage-as-Narrative is one where instead of facilitating an ethical relationship between teachers and students, GenAI implementation stands to engender agonism.

Diffraction through critical humanism

The second set of theories were grounded in critical humanism. One might expect that critical humanist Paulo Freire would have no issues with GenAI in education. Freire recognised the importance of using technological advances (Jandrić 2021). Freire (2021b) confirmed that education ‘involves processes, techniques, expectations, desires, frustrations, and the ongoing tension between practice and theory’ (p. 113). Freire’s philosophies accommodate structured teaching approaches (Chambers 2019).

Freire’s educational philosophy regarding writing developed during his exile from Brazil, while he worked in Chile (Gadotti and Torres 2009). Freire taught adults who had been denied educational opportunities. Current educational landscapes continue to leave out and classify students in a similar manner (Evans *et al.* 2021). These are students with various physical, cognitive, learning, language, and cultural differences.

In the Assemblage-as-Narrative, efficiency is prioritised. Freire’s ideas are inefficient. In *Education for Critical Consciousness*, Freire (2008) dispelled the complaints to his view of education as ‘time wasting’ (p. 105). According to Freire (2008), time required for teachers and students to interact through authentic dialogue was never a waste of time. Time for dialogue is time spent in a life giving activity that Freire contrasted with oppressive educators who ‘in-animate’ everything’ (Freire 2006, p. 59).

Dialogue was Freire’s essential mode for student–teacher interaction, feedback, and teaching. For Freire (2006), dialogue-centred relationships equalised power between student and teacher. Teacher feedback must be ‘*with*’ the student (p. 93). Freire emphasised this point by with italics. Professional learning for GenAI may be consistent with Freirean dialogue when feedback from GenAI is used *with* the students, and not in place of this interaction between students and teachers.

Freire would disagree with requiring all teachers to attend professional learning. Freire’s (2006) entire educational philosophy prized freedom. ‘Manipulation, sloganizing, depositing,’ regimentation, and prescription cannot be components of revolutionary praxis’ (Freire 2006, p. 126). If professional learning followed Freirean principles much of it would be disqualified. In Freire’s later work, he exchanged the word *oppression* for *invader*. ‘The invader dictates; the invaded patiently accept what is dictated’ (Freire 2008, p. 103).

The ethos of the Assemblage-as-Narrative indicates that standardised prompts will be used for writing. In Freire’s dialogic view, there should be no standardised prompts because writing ought to develop organically from worlds and lives of students. In Freire’s (2021a) *Pedagogy in Process: Letter*

to Guinea-Bissau, he explained the need for cultural awareness of the adult learner's world. Freire wrote that literacy education 'can never be looked at in isolation' (p. 63). Generic prompts that are not based in the existential worlds of the students are not dialogic.

Freire's ideas about quality in education are based on its ability to liberate and transform the human and the human's environment. Freire (2006) recommended praxis (p. 87). As dialogue equalises power, Freire's praxis is sharing of power between human acts and human reflection. Human action without reflection is mere 'activism' (p. 65). Reflection on its own is simply 'verbalism' (p. 87) where words are produced to satisfy the institution's need for documentation. For quality writing experiences, the goal should be to cause transformation. For *praxis*, Freire demands that work, such as writing, should be coupled with authentic dialogue towards the goal of *conscientization*. Also, Freire (2008) cautioned that 'there should be no exclusive support for either 'technology' or for 'humanity'' (p. 114). In the Assemblage-as-Narrative, technology has been divided from humanity in that it makes teachers and students *more* beholden to others (e.g. employers) rather than freer.

Freire's (2006) conscientization invites trust. A teacher's 'efforts must be imbued with a profound trust in people and their creative power' (Freire 2006, p. 75). In the Assemblage-as-Narrative, the central administration's plan seems guaranteed to engender an atmosphere of low trust between the administration and the teachers, and between the teachers and the students. For Freire (2006) 'it is necessary to trust in the oppressed and in their ability to reason' (p. 66). In the Assemblage-as-Narrative, it is not only the students who are oppressed by the system. The teachers are not trusted either. The teachers are oppressed, commanded with no options, not spoken *with*, and denied opportunities for transformation that lead to freedom.

Diffraction through conviviality

The third set of theories focused on radical polemics. Technologies do not operate separately from human creators. In 1770, a Hungarian inventor built an intricate mechanical chess player because of the assumption that chess operated as a Western instrument to measure intellect. The inventor tricked the royal court into thinking that a wooden construction could win at chess; in reality, there was an expert chess player inside the apparatus playing incognito (Crawford 2022). A central part of the story is how the inventor was attempting to assert a particular narrative about technology's role in determining intellect, but that narrative was built at least partially on deception and illusion. It was also built on the presumption that skill at a cultural construct – the game of chess – is what does and should constitute intelligence.

In the Assemblage-as-Narrative where teachers need to learn to use GenAI to serve student writers, there are cultural narratives operating about *universally* good writing. For example, making letters in elegant cursive script was once considered a hallmark of intelligence (Fox 2014). What are contemporary signifiers of intellect that are believed to be *universal*, but are culturally coded? How have these crept into corpuses that have been stolen by LLMs for GPT technologies? There are also tensions around how much children and teachers should play with technology versus learn with it. Chess is a game. Or is it practice for logical thinking? An opportunity to learn patience? An exercise in non-violent aggression? When children in Paraguay and their teachers were given laptops and they wanted to use them for what researchers called recreation, this was considered a failure (Broussard 2019). We ask: why do the researchers have the right to determine what is learning and what is play in the classroom space?

Such circumstances raise important questions about the seeming need in the Assemblage-As-Narrative to prepare teachers to use GenAI properly to ensure that teachers use technologies with students only for purposes that are evaluative and remedial so that students can replicate *universally* good writing. Such a need is not reflective of how technologies are used outside of school. Illich (1975) suggested that technology's primary purposes should be to promote a conviviality where people come together to share joy. This is not to say that students and

teachers could not enjoy writing together where they identified areas for improvement, but historically, that is not how interventions have operated. Instead, technologies are used to *do to*, or *do for* the students, rather than *doing with* them.

One way to know whether there is a convivial intention of the project proposed by central administration in the Assemblage-as-Narrative is whether and how much they ‘restrict personal autonomy’ of teachers and students (Illich 1975, p. 64). There is little room for teacher and student decision making, especially since there is not even the choice of whether to attend the sessions. There is also no space for thinking about the amount of time spent using digital tools and whether that is best use of time for young people and teachers. Framing professional learning for GenAI might be a proposition framed around what Lee (2021) described as a symbiosis between humans and machines. Using GenAI as an instructional convivial tool would provide opportunities for growth, creativity, and inspiration. Shifting from a tutorial or remedial purpose to a pedagogical purpose opens the space to work convivially with GenAI.

While we may not be able to escape the entanglement of technologies with our bodies and our lives, Illich (1975) warned of the dangers when machines have priority: ‘When people become obsolete and need constantly to renew their educational security, when the accountant must be reprogrammed for each new generation of computers, then learning has indeed become scarce’ (p. 72). Radical polemics asks school leaders to consider the needs of children and families over the needs of those who are promoting GenAI.

Diffraction through community-engaged praxis

The last set of theories focus on community-engaged praxis. Choosing educational tools is a political act. Tools reflect the beliefs and desires of their makers; they are algorithmic mediations of social relations (Ziarek 2022). Cultural tools reproduce themselves, so it matters which tools we choose just as it matters whose stories tell stories (Haraway 2019). Choosing to narrate an agent as a tool is also an social and political act (Harari, 2024). The underlying technologies used to create GenAI systems is distributed knowledge across various individuals. AI-enabled algorithms might be recast as lumps of clay. Whereas GenAI emerged from militarism and patriarchal capitalism, algorithmic clay as biological material defies its origins and can be welcomed as collaborator (Haraway 2019).

GenAI could be a collaborator to create and *make with* personal and cultural empowerment. *Making with* entangles temporalities and spatialities as intra-active entities-in assemblages. Together, these are more-than-human, other-than-human, inhuman, and human-as-humus (Haraway 2019). A community-based perspective shifts conversation to in the direction of *make-with*.

For example, the free and open software movement (FOSS) has existed since the 1980s (Gonzalez-Barahona 2021). Yet, FOSS has no hold in K-12 education. Since 2008 professor and creative computing researcher Rebecca Fiebrink has been offering Wekinator software. Before Fiebrink, there was already a burgeoning field of open source coding tools built for non-programmers. When designing with open-source programs called Processing, p5.js, and the Wekinator, students and teachers also have opportunities for a more collaborative ethos. Not all open-source projects are as explicitly inclusive as the Processing and p5.js coding community, but their shared community statement provides an example of the philosophies typical to open-source tools. The following statement appears on the front page of the website for the p5.js programming platform.

We are a community of, and in solidarity with, people from every gender identity and expression, sexual orientation, race, ethnicity, language, neuro-type, size, disability, class, religion, culture, subculture, political opinion, age, skill level, occupation, and background. We acknowledge that not everyone has the time,

financial means, or capacity to actively participate, but we recognize and encourage involvement of all kinds. We facilitate and foster access and empowerment. We are all learners. (p5.js, n.d. para.)

Compare this philosophy with the mandate for erasure from the Assemblage-as-Narrative. The central administration proclaims: *This exciting new program will focus on students identified with special educational needs and students who speak languages other than English or forms of English that are less preferred by our valued local employers.*

In contrast to the closed source prescriptive tools imposed on teachers to *universalize*, there are multiple public initiatives underway to create more inclusive, accessible, culturally situated tools that use GenAI. One example of the open-source commitment to community, access, and inclusion comes from the Wekinator website titled, *Posthuman Feminist AI: Bits and Bytes, Creating with Unheard Voices in AI Design*. This ongoing project uses Fiebrink's tools to collaborate for protest and for purposes of civic engagement (Fiebrink n.d.). All are welcome to join the collaboration regardless of computer program or other technology expertise. The group focuses on AI design with attention to embodiment as well as cultural and emotional needs (Fiebrink n.d.).

Another initiative, called FLAIR (First Languages AI Reality) is an Indigenous-focused group (Mila n.d.). A sister project of FLAIR is the Lakota AI Code Camp, a summer camp for Lakota youth to learn Python, data science, machine learning, and app development (Coffey 2024). AI Code Camp's ethos draws on ethic of the social good and local cultures (Goldweber 2015). During the camp, students create apps based on their own local interests in what they would like to preserve, such as flora and fauna. Under these circumstances, it is crucial to explain to the local community and to young people how GenAI works and what the implications are for local knowledges, once these are positioned in the technologised spaces. Such community-based projects have more potential for *doing-with* teachers and students than current proposals to *do-to* them. Even so, caution should always be taken with any initiative claiming to preserve culture, especially if that initiative intends to gather up culture and sell it.

According to Blain et al. (2024) humans need to learn to interact with machines; while the machine has a goal, it is mindless. The programmer controls the goal. Teachers and students need the ability to design not just the lesson or choose the technology – they need to be able to design it themselves as programmers. This is more than prompting GenAI. This is about real control of how advanced technologies are designed and implemented. Within a frame of community-engaged praxis, central administrations need to support teachers and students in learning to *make with* self-directed technologies, and/or to be free to not use these technologies at all.

Discussion

In *reading-through* the Assemblage-as-Narrative enabled many entangled opportunities to (re) consider hierarchies, (re)consider the (non)human, and (re)configure for solidarity.

(Re)considering hierarchies

Diffractional knowings generated from the Assemblage-as-Narrative challenged the hierarchies of human and (non)human. First, language functioned as a material consideration for forms of life (Wittgenstein et al. 2009). This included aspects of controlling the form and content of professional learning as well as guiding student and teacher perceptions. The use of language to materially constitute bodies took shape as a lack of dialogue (Freire 2006). GenAI was more worthy of trust in its capacity to use and produce language than children or teachers (Freire 2008). Such findings have also emerged in previous research studies where teacher judgement and emotion are considered harmful to the project of demanding teachers use GenAI (e.g. Nazaretsky et al. 2022, Velander et al. 2024). The concept of GenAI as the most competent agent should give pause (Harari 2024).

Instead of an imaginative orientation to GenAI (Illich 1975), GenAI in scenarios such as in our Assemblage-as-Narrative provide the machinery of technology for teachers to *do things to* students, particularly students who have been historically traumatised and treated poorly in schools. The technological agent was also supposed to *do to* teachers through eliminating their decision-making capacity while telling them the story that it is easing their workload. While GenAI represented an assemblage of human knowledge, teachers and students could not fully participate because they lacked access to coding knowledge and resources (Fiebrink n.d.). Moreover, there were no meaningful structures for doing conviviality with GenAI within local knowledge and community norms (Illich 1975, Goldweber 2015). A perceived need to remediate students with stringent tutorial practices to please local employers should not be confused as a local concern; this is a hierarchical proposition based on a racial social contract and universalist goals (Brayboy 2005; Mills 1997). Findings from this diffractive reading suggests that if GenAI is used at all, it should be *done with* teachers and students, rather than *done to*—all the way from the coding down to the pedagogy. Researchers can study what happens when teachers have more technical knowledge and can engage more fully in collaborations with students and community members beyond doing the bidding of conglomerates of local employers. There also might be great learning that comes from involving more members of local communities in land/water issues with respect to when, how, and to what extent environmental degradation is a manageable risk for some educational benefit (Rice and Argüello de Jesús, 2024).

(Re)considering the (Non)human

Entangled with the notion of challenging hierarchical ways of knowing and doing and being are questions about what is human. It is also important to consider how teachers, students, and school leaders can respond to questions of *Being* together. GenAI programs and applications are often positioned as *tools*; yet tools are made from people's work, and they are never without context and history (Illich 1975). Thus, who and what is a tool and what is a machine and what is an agent can shift (Harari, 2024). Are GenAI truly being used as tools in the Assemblage-as-Narrative? Or are teachers being used as tools since they are supposed to do the bidding of the market to use the GenAI to ensure the on-going demand? A teachers-as-tools framing adheres closely to the tenets of the racial social contract where *universal goods for universal progress* have been touted (Mills 1997).

Another possibility is that the learners are being used as tools. Schoolchildren must become as tools to ensure that using GenAI seems normal, universal. This framing aligns with colonization discourses as well; GenAI is designed to take more jobs than it creates, cost more money than it saves, waste more time than it preserves, and consume more energy than it generates (Powell 2024). Instead of a divide existing between children who do/do not have access to AI or who do/do not learn to use AI well, there will be more complicated fractures and fissures around how children are able to take on their own agencies as writers and thinkers, how children survive the devaluing of their efforts to make and do, how children survive in communities where environmental effects from GenAI are visible and crushing, and how children move back and forth best between worlds AI creates for them and ones they create for themselves. Findings from this diffractive reading suggest that teachers' professional learning about GenAI cannot occur outside of learning about historical trauma and survival of the exploited. Telling teachers how GenAI works does not mean telling teachers GenAI is smarter or more objective than them (Nazaretsky *et al.* 2022, Velander *et al.* 2024). It does not even mean helping teachers understand more about the linguistic algorithmic underpinnings, although that is part of what needs to happen. Instead, it means giving teachers information about the environmental traumas and realities of students with learning differences when teachers use advanced technologies, including GenAI (Rice and Argüello de Jesús 2024). Research studies might focus on how teacher thinking and decision making emerges when teachers have this critical information for instructional planning where the teachers are agents not tools of GenAI or the companies that profit from GenAI's use and distribution.

(Re)Configuring for solidarity

Mills (1997) described how the social contract was written to inscribe White-ness and then presumed neutral. Recognizing power configurations is insufficient. Diffraction opens spaces to do something outside of naming power. In this work, diffractive readings revealed the need to approach professional learning with the understanding that *universal good* for *universal progress* is a myth, and so is the need to place deficit labels on students and teachers to maintain the myth (Brayboy 2005, Jackson 2020). What animates the promulgation of the myth of the miracle of GenAI is the need to use it to fix students who sit in the most precarious places on the educational landscape. Destabilizing this myth is necessary to build coalitions for communities that serve everyone better (Mohanty 2003).

What the findings from this diffractive activity suggest is that diffraction itself may be part of the pedagogies for professional learning that will present pathways for rejecting universalism. Some teachers or teacher educators may think they would *never* do what is presented in our Assemblage-as-Narrative scenario. That is fine. They can write their own scenario and subject it to diffraction. They can gather a group of colleagues and use multiple theories without the intent to compare the theories – but to gain insight. They can see what they learn about what they are asking of teachers. Such work would also present interesting opportunities for further research into how teacher educators learn what they do, does to teachers and in turn, does to children.

Conclusion

In this paper, we used critical posthumanisms to diffractively explore an Assemblage-as-Narrative where teachers were required to learn to use GenAI for tutoring against multilingual children and learning with learning differences. We used *reading-through* to learn how to challenge hierarchical thinking and (re)consider who and what materialised as tools. We also demonstrated the need to acknowledge historical trauma and current realities of oppression and inequity in teaching teachers to use GenAI. Moving forward, professional learning for teachers might take diffractive perspectives in considering how to *read-through* to upend *universalism* for GenAI in practice.

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