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Bringing the Philosophy of Technology into Dialogue with Educational Practice: Reflections on Artificial Intelligence in Technology Education

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Abstract

Technology has long been interwoven with education, and over the past decades digital tools have played a central role in shaping both pedagogical practices and conceptions of what it means to learn, and to teach. When emerging technologies such as accessible artificial intelligence (AI) enter the educational landscape, they bring with them a complex interplay of promise and peril, sparking tensions around how and when AI can or should be used – or deliberately avoided. While much attention has been given to questions of implementation and ethics, less focus has been placed on how these technologies reshape the very conditions of education. Such questions cannot be resolved merely through practical or ethical guidelines; they require reflection not only on what AI can do, but also on how it mediates human intentions, judgment, and responsibility. The aim of this paper is therefore to explore how philosophical perspectives can illuminate the reflections that underpin technology teachers' choices and support a more reflective engagement with AI in technology education. These reflections are grounded in interviews with three technology teachers who describe their encounters with AI in their teaching. The analysis is guided by philosophical dialogues, engaging teachers' reflections with the work of philosophers whose ideas resonate in today's debates on emerging technologies. By bringing together philosophers' and practitioners' reflections through our analysis, the paper situates AI in technology education within a broader societal context, under the themes AI technology as potential, as disruption, and with awareness. Such an orientation invites teachers to view AI not merely as a pedagogical tool, but also as a technology that both shapes and is shaped by human actions.

Key Words: Technology Education, Artificial Intelligence, Philosophy of Technology, Technology Teachers

1 INTRODUCTION

Technology has long been interwoven with education, and over the past decades digital tools have played a central role in shaping both pedagogical practices and conceptions of what it means to learn, and to teach. When emerging technologies such as accessible artificial intelligence (AI) enter the educational landscape, they bring with them a complex interplay of promise and peril, sparking tensions around how and when AI can or should be used – or deliberately avoided. While much attention has been given to questions of implementation (e.g., individualization of learning) and ethics (e.g., plagiarism and protection of student data), less focus has been placed on how AI technologies reshape not only subject content but also the very conditions of technology education in a democratic society, especially from teachers' point of view. Teachers are central classroom actors, though in research often overlooked, and they have to make active choices on what and how to bring up AI in technology education when curricular guidelines are few (Mouta et al., 2025). Such choices require ethical and philosophical reflections that are also under-researched as such and as part of teachers' discourses, while much philosophical research seems to be directed toward the possible replacement of teachers by AI (e.g., Jin & Wang, 2025). In this paper we focus on the philosophy of technology, in particular philosophical frameworks that could engage teachers in making sense of AI in technology education, in relation to society and the environment. Methodologically, therefore, we want to bring the philosophy of technology into dialogue with technology education (e.g., Hansson, 2008).

The aim of this paper is to explore how philosophical perspectives can illuminate the reflections that underpin technology teachers' choices and support a more reflective engagement with AI in technology education. The contribution to technology education lies in providing conceptual resources for understanding what is at stake when AI is introduced to educational practice.

2 BACKGROUND AND LITERATURE REVIEW

Technology education in compulsory school should provide students with opportunities to develop skills in creating and using technology, including both practical applications and understanding of the contexts in which they can be used. AI, as a broad and multifaceted technology, is included naturally in technology education and also enables meaningful integration of knowledge across multiple subjects. However, it also carries risks, such as how systems are trained, potential biases in algorithms, and the impact on students' critical thinking (Mannila et al., 2025). Education must therefore address how AI can be used, and when its use is appropriate. AI is described as a technology with major implications for future societal development, which means that students need knowledge about AI to critically engage with its applications and consequences (Rawas, 2024). This requires space for reflection and discussion where these concerns can be raised by both students and teachers. Such considerations may thus be reflected in how teachers describe their encounters with AI in education.

To address these considerations, we employ philosophical analyses of arguments and views that relate to AI. The philosophy of artificial intelligence is an important facet of the philosophy of computing. However, it has arguably also been one of the most researched topics in the philosophy of technology as a whole for several decades, although much of the research pre-

dating the 2000s was carried out under different conditions compared to today. Currently, the research is extensive on topics such as natural language, cognition, and general intelligence as well as robotics and artificial agents (e.g., Boddington, 2023; Brey & Hartz Søraker, 2009; Stolpe & Hallström, 2024; Weizenbaum, 1976). The area of AI ethics has grown a great deal in recent years but it also has a longer history dating back as far as the 1960s and 1970s (e.g., Boddington, 2023; Coeckelbergh, 2020). However, there has been a lack of philosophical research that situates AI in teacher discourses and practices, specifically in technology education (e.g., Wieczorek, 2025).

3 METHODOLOGY

This study is philosophical but grounded in empirical examples as vignettes to illuminate teachers' arguments on how they reason about AI in technology education. These vignettes were based on empirical interview data collected through semi-structured interviews with three technology teachers in lower secondary education in Sweden, as outlined in Lundberg et al. (2025). In this study, philosophical inquiry is co-constructed with teachers' reflections and philosophers' concepts through an iterative, reflective dialogue concerning how AI mediates human intentions, judgment, and responsibility. Philosophical analysis is therefore understood here as a dialogical process (Hansson, 2008).

The philosophical analysis was carried out on arguments and views that were prominent in the interviews, as illustrated by the vignettes, but mainly pertained central philosophical concepts and concerns as they have been discussed by prominent philosophers of technology, in line with established philosophical methods such as interpretation/hermeneutics and argumentation. The degree of stringency of the philosophical analysis ultimately decided the validity of the method (e.g., Dusek, 2006). Finally, the results of the philosophical analysis were fed back to the technology education domain to inform implications for teaching, thus fulfilling the methodological role of the philosophy of technology in this paper as a dialogue partner (Dohn, 2011, p. 431-432).

The authors have not employed AI in the analysis or writing of the paper.

4 PRACTITIONER REFLECTIONS FROM A PHILOSOPHICAL STANDPOINT

The teachers express three different perspectives on the role of AI in technology education. These three perspectives, of which we will showcase one example of each from the data in form of vignettes, also reflect three different philosophical standpoints. Here, we label the teachers' perspectives as: (1) AI technology as potential; (2) AI technology as disruption; and (3) AI technology with awareness. We thus anchor the data in the philosophical literature, both to show how AI makes up a pertinent example of technology relevant for technology education and how it reflects broader issues concerning technology that have been around for a long time, even before there was something called AI. As such, the teachers' views of and relationships with AI reflect broader themes that can stimulate discussion of and reflection on AI in the technology classroom.

4.1 AI technology as potential

This perspective explores AI as an evolving technology in educational contexts. The analysis focuses on how technological openness raises questions about basic understanding and educational responsibility in relation to future developments of AI.

Teacher A describes AI as a technology with significant potential and argues that students need a solid technical and conceptual foundation early in their encounters with AI in order to participate meaningfully in a rapidly shifting technological environment. While acknowledging that AI may develop in many different directions and be applied across various domains both in school and outside of school, Teacher A maintains that technology education offers a crucial starting point. By understanding how AI systems work, how they are designed, and how these design choices influence outcomes fed back into social practices, students gain a framework to use when engaging with future AI developments.

An influential ontological voice in thinking about the potential of technology is Gilbert Simondon, who emphasizes the importance of understanding the genesis and evolution of technical objects (Dakers, 2019). Simondon highlights the need to cultivate a technological understanding as *'things'* (in the broad sense, encompassing all forms of being in the world) are never fully stable, but always subject to transformation. Rather than viewing technological objects as alien intrusions into human life, Simondon describes them as metastable and relational. For example, in a system atoms can exist in a metastable equilibrium where a potential for reorganization within the system is present. When the atoms are disturbed, say through changes in temperature or pressure, they can reorganize into a different structure. What kind of structure is thus dependent on how the system is disturbed, and this process, metaphorically applied to technology, Simondon defines as *individuation* (Simondon, 1958/2020).

According to Teacher A, students' understanding of AI likewise has the potential to evolve differently depending on how they are exposed to and use AI in school. What appears as a gradual growth in students' understanding can be seen as the actualization of different potentials depending on different classroom engagements. The teacher raises the idea that knowledge about AI is shaped differently depending on the subject-specific setting and emphasizes technology education as a site for developing an understanding of both technical and conceptual knowledge. Strengthening the students' understanding through technology education is therefore articulated as an opportunity to support their further engagement with AI. Analytically, this resonates with Simondon's account on how this process occurs through human intervention, and is shaped through individuation, thus the human subject and technology co-develop in relation to their milieu (Simondon, 1958/2020). That is, to understand technology, Simondon emphasizes that one must engage with its internal logic and genesis, not merely its function (cf., Arthur, 2009). While the teacher's reflection resonates with Simondon's emphasis on development of technology, it simultaneously introduces an insistence on technology education as a starting point. This account suggests that although the development is open-ended, it nevertheless requires a structured introduction.

The teacher's perspective resonates with long-lasting promises of technology in education but also philosophical strands about technology and its role in human life. It invites us to consider

the ontogeny of technical objects as technologies evolve and converge through processes of individuation, where each technical object carries within it a history of transformations as well as potential for future development (Simondon, 1958/1980; cf., Briggs & Burke, 2009). The teacher suggests that AI in education cannot be understood through its design, or its intended functions, alone. Instead, AI is to be approached as a technology laden with potential, where the teacher guides the process of individuation through pedagogical strategies, and where the result of using AI is neither predetermined nor fixed. In this light, AI can be considered as an offshoot of a longer trajectory of evolution in technology education, one that calls for a different way to meet technical competence (use of AI) and education capable of fostering meaningful participation in technological becoming (understanding AI). Consequently, the individuation of AI carries on as students participate in and contribute to the ongoing shaping of AI not only within technology education but also in broader contexts.

4.2 AI technology as disruption

This perspective addresses how AI is understood as a technology that challenges our engagement with practices and responsibilities. The analysis focuses on reflections on consequences and disruptions that accompany AI use when the technology itself is still emerging.

Teacher B approaches AI as a technology that unsettles established ways of acting responsible with digital tools. While recognizing the benefits and efficiencies AI may offer, the teacher raises concerns about how its consequences may remain invisible to users and only become clear when practices have already adapted to them. Furthermore, the teacher emphasizes an educational responsibility to make visible the values, assumptions, and limitations built into AI systems, and to address these problems before they become normalized and embedded in systems and practices. For Teacher B, engaging with AI in the classroom is therefore not primarily about adopting a new tool, but about responding to a disruption that is still unfolding and whose implications are not yet fully known.

Political philosopher Langdon Winner argues that technologies are not mere instruments to be used by humans, nor can they be controlled without understanding of and reflection on their impact. Embedded in their intended use is an implicit assumption that the developed technology represents an improvement of human life, an assumption that influences behavior and traditions related to how tasks are carried out. According to Winner, this notion of improvement is seldom questioned or subjected to critical evaluation. Nevertheless, he sees how technology carries specific assumptions and political values and as such, they affect society and therefore cannot be considered neutral technical tools (Winner, 1986, 2007).

While Winner underscores critical engagement with existing technology, the teacher's reflection is situated in an ongoing development where both use and consequences are still emerging and debated. The teacher raises a concern about the problems we might build into the system understood as the unintended consequences only become visible once the results of our actions unfold. Thus, teacher B approaches AI not as a static or neutral technology, or even a stabilized technology, but as one shaped within and outside of educational practice and carrying consequences – advantages as well as disadvantages – that extend beyond the classroom, and where education about AI makes this dynamic evolution explicit and visible.

The question raised by the teacher and revoiced through Winner is thus not simply how AI can improve society, but rather what kind of society we want AI to help us build (cf., Axell, 2019). Viewing AI as a tool to be used without concern therefore becomes problematic, and Winner argues that the discussion must shift from technical efficiency to political and moral reflection (Winner, 1986). The teacher highlights the need for caution and responsibility in relation to human influence, and how education about AI must make human participation visible in shaping both problems and possibilities that become actualized. This view concerns not only active users of AI, but also those who are excluded from using it and how technology can become controlling and disrupting for those who do not understand it, and underscores the need to move beyond a purely instrumental view of technology and reflect on its premises and implications (cf., Ropohl, 1997), and how questions regarding the social and ethical implications can be brought into pedagogical practice (Winner, 1986).

4.3 AI technology with awareness

This perspective introduces AI as a technology that mediates experience and perception. The analysis highlights reflections on the importance of cultivating awareness of how AI shapes what decisions are prioritized in educational contexts.

Teacher C describes AI as a technology that shapes how the world is perceived and acted upon. AI is described as a tool that can make tasks easier and more efficient, but at the same time something that risks pushing certain aspects of experience to the background. For this reason, the teacher sees teaching about AI as an opportunity to draw attention to how technologies mediate understanding and decision-making. The teacher emphasizes the importance of helping students recognize both what AI enables and what may become less visible through its use. In this sense, the classroom becomes a space where students can critically engage with how AI participates in shaping their ways of seeing and responding to the world.

The post-phenomenologist Don Ihde argues that technology should not be seen as isolated or autonomous, but rather as something that exists in relation to humans and their lifeworlds, presented as different types of human-technology relations. Technologies enable certain relations, which then change our perception, and can be understood in a positive sense as an expansion of human capacities. This allows us to see aspects of the world that would otherwise remain hidden, for example, using spectacles or a hearing aid make visible or audible what was previously inaccessible (Ihde, 1990). Instruments such as the electron microscope even create entirely new ways of perceiving reality (Ihde, 2011). These technologies therefore do not simply add more detail to what we already know but they enrich and transform our relation to the world itself which will appear differently depending on the technology we use (Keirl, 2019; Mitcham, 1994). AI technology is thus an example of such a technology that is experienced differently depending on its application and uses, shaping how the user acts and perceives the world (Ihde, 1990, 2002). The teacher highlights how technologies mediate experience and emphasize the importance of making this visible in education about AI. In this sense, the teacher foregrounds the educational need in how to critically engage with AI, illustrating the role in how AI is realized in education, and by extension what students learn about AI and society.

Ihde reminds us that no extension comes without transformation. Just as a microscope allows us to see what is otherwise hidden but narrows our field of vision, AI brings some things into sharp focus while pushing others to the periphery (Ihde, 1990; Keirl, 2019; Mitcham, 1994). As we adapt to what AI makes easy or visible, we may gradually unlearn what slips beyond our sight. The risk is thus not only that we overlook what AI cannot see or grasp, but that our own ways of seeing changes in the process. Although the teacher acknowledges the risks inherent in technological mediation, a call to reject AI is not implied. Rather, the reflection is situated at a critical juncture where ethical and democratic responsibility arises as teaching about AI not only concerns the technology that already exists, but also how educators and students engage with emerging applications of AI. Ihde sees the relationship between human, instrument and the world as central, and calls for active participation. Thus, we are called not only to perceive and critique but to respond to, and shape, new technology (Ihde, 1990), including AI (cf., Feenberg, 2017). Similar to the teacher's account, learning about or with technology is never a neutral process according to Ihde, and he emphasizes that it becomes important to discuss how technology shapes learning and not merely what is learned (Keirl, 2019). Accordingly, the premises of education are subject to change and need to be evaluated when we teach through AI, in technology education as well as in other subjects.

Teacher C reflects on the impossible task of predicting how AI will be used in the future. While the thought itself can be daunting, the teacher insists that part of the process is that the students must understand what already exists, and what is possible to do with AI, where strategies for using AI become central, even when the future remains unpredictable. AI takes shape through interaction and intervention from both teachers and students, and from this standpoint, the role of the teacher is to develop and exemplify strategies for how AI can be used. Feenberg (2017) builds on this by introducing the idea of democratic intervention, highlighting that citizens actively can influence and shape technology rather than simply adapt to it. In this way, students will acquire knowledge needed to navigate AI both critically and competently. Teacher C highlights that with the teacher as a guide comes an awareness of responsibility: their interventions shape how AI is introduced, how it is understood by students, and ultimately how students engage with AI and the world unfold.

5 CONCLUSIONS AND IMPLICATIONS FOR TECHNOLOGY EDUCATION

AI in education is frequently discussed in terms of tools, uses, or outcomes. When AI is reduced to the input and output of education, there is a risk of obscuring how technology education is shaped through teachers' choices, how these decisions influence what is learned, and what consequences are actualized through the use of AI. In this paper we have used philosophical dialogue between teachers and philosophers as a method with the idea that they both are to be understood as "equal partners with distinct voices who have equal rights to call the views of each other into question" (Dohn, 2011, p.448). Therefore, in the dialogue, teachers and philosophers both bring perspectives on AI to strengthen and problematize AI in technology education together, thus actively shaping the meaning and direction of the educational significance of AI. By doing so, this paper demonstrates three ways in how AI can take form in technology education.

First, AI technology is discussed as potential that will continue to develop in different directions depending on use. While this openness of direction is not discussed as good or bad, a foundational understanding of AI provides students with the possibility to engage with future AI developments in informed and reflective ways, and where educational research may benefit from recognizing technology teachers already existing orientations regarding conceptual and technical knowledge. Here, students and teachers both participate in and contribute to the ongoing shaping of what AI will evolve into.

Second, AI technology is framed as a disruption, and there is an emphasized need to address how emerging technologies reshape practices and responsibilities, and how consequences of its use affect us. That makes it insufficient to focus solely on technical functionality in AI. Teaching about AI is thus to be found in a situation where it becomes important to address the embedded assumptions on technological development of AI before AI technology becomes stabilized.

Third, AI technology needs to be taught with awareness. Teaching about AI involves students understanding the consequences of their use, but also how their own design choices, values, and assumptions become embedded in the systems as they develop. This allows the students to actively take part in the shaping of AI technology rather than merely adopting or adjusting to it. Therefore, teaching about AI also includes how technologies shape our perception and understanding.

Together these perspectives present AI not as carrying finished technological functions or with a fixed meaning, but as shaped by its internal structures and in relation to the users and society, for good or bad. AI can thus be recognized as a technology with an ongoing evolutionary trajectory, where teaching about AI must include establishing the conditions under which it can be understood to support a reflective use beyond educational settings. Engaging with philosophers' and practitioners' arguments encourages a reorientation of philosophical reflection toward the educational practices through which AI is enacted in technology education, and perhaps also to understand how AI shapes and is shaped in broader educational contexts. Therefore, teachers' interpretations and decisions are decisive in shaping how AI takes form in education.

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