An Argument against the Unlimited Applicability of Artificial Intelligence in Classroom Settings

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Abstract

The manifold application of various artificial intelligence (AI) tools, systems, devices etc. has gained intensive attention in contemporary interdisciplinary research. We will develop an argument that indicates why AI systems are not adequate for certain educational purposes (related to 'Bildung', as formation and self-formation of personalities). Our argument rests on the following assumptions: a) Neither technophilia nor technophobia leads to any cautious, sensible, and self-reflective handling of AI systems (Section 1). b) The distinction between weak AI and strong AI is fruitful. A well-conceived definition of AI will point out some limitations even of strong AI in comparison with the basic characteristics of human intelligence (Section 2).

Nevertheless, we find various fields of prudent applications of weak AI for classroom settings (Section 3). There is a heated debate on why AI is no instrument for certain educational processes because of fundamental considerations. Here we argue that education urgently needs some kind of philosophically-driven return (Section 4.1). Finally, Section 4.2 will indicate in more detail where we find, at the heart of education, a division between AI systems and human teachers.

Key words : AI systems in classrooms; technophilia; technophobia; Bildung; Philosophy of Education

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In this paper[1], we will basically argue against a certain claim that makes AI a universal supertool for educating young students. Obviously, AI is relevant to many respects off classroom settings. I do not support any technophobic view on the application of modern media to avoid some common objections right at the beginning (Section 1). But this does not imply that we should join in the chorus of unlimited technophilia. As Anderson recently stated, we need discussions on the kind of technology to be incorporated in classroom settings: 'Overall, educational scholars and practitioners debate *how*, not *whether*, to incorporate the latest technology into schools' (Anderson, 2018, p. 7).

Of course, robots and computer programs may very well support the young learner's competencies and even promote knowledge-gaining (Section 3). Nevertheless, a considerable body of research overestimates

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the technical aspects and consequences of their use (see various contributions in Penstein Rosé, 2018). We will also focus on the pedagogical and philosophical implications (Section 4). There are, as always, a lot of interesting and challenging questions:

- *Can AI really initiate more than processes when it comes to the gathering and structuring of information?*
- *Is it an adequate tool and paradigm to initiate higher-level education in the notion of upbringing (and especially 'Bildung' [German] in connection with a fully developed philosophy of education?*
- *Does it serve as a single instrument or is it a new paradigm in case of upbringing of children?*

In this paper, we will focus on the second question.

1. Artificial intelligence applications beyond technophilia and technophobia: Remarks on ideologies

Widely varying views on the relevance and significance of AI systems in education and other sectors are obviously driven by ideological presuppositions (see e.g. Davidson, 2017a, 2017b). In comparison with classical teaching instruments and teaching materials, the applicability and superiority of AI systems is often simply stated without explaining in which respects benefits can be balanced against risks. Furthermore, a rather instrumentalist and segregating view is preferred while neglecting the fact that each classroom setting must be regarded as an element of education that affects other elements even if

this is not plausible at first sight. Let us consider an example: Unlimited use of smartphones as a tool for making enquiries may neglect the fundamental differences between written books and more or less acceptable sources found online. Use of smartphones affects the views of students in terms of reliability of knowledge, the need to read and understand long and complex texts, the ability to reflect the context of genesis of texts etc.

The framing of any argument in the context of AI applications should consider if and how technical inventions are labelled as valuable or not. From my point of view, neither technophilia nor technophobia helps when we describe and reflect on AI applications in classroom settings. To illuminate the point of technophilia, we can refer to Anderson (Anderson, 2018):

> In other words, technophilia is a world-view that sees all new technology as inherently positive and beneficial to human life. The language we use to describe technology is indicative that we live in a time of technophilia. Phrases like "technological advancements" or "technological progress" are commonplace; we seem to lack the language to describe changes in technology that do not imply that they are inherently beneficial. Additionally, deeming devices with the capacity to connect to the Internet as "smart" (e.g. "smartphones," "smart televisions," etc.), rhetorically reinscribes an ideology of technophilia while granting epistemic credit to inanimate devices. (Anderson, 2018, p. 8)

Technophobia, on the other hand, refers to the transfer of negative views on technical inventions, devices, concepts etc., mostly in a very unconscious way, to one's own philosophical worldview. Why technophilia and technophobia are considered as ideologies in a sense of 'unreflected views' on what we should think and do? First, ideologies

are pervaded by unexpressed persuasions such as 'The Internet makes pupils stupid' (see Davidson, 2017a). Second, the irrational core of ideologies partly impedes a sensible discussion such as why and how pupils learn differently when they use AI systems compared to more classical learning and teaching systems (see Luckin, Holmes, Griffiths & Forcer 2016).[2)]

One last remark on the need to expose ideological presuppositions: It seems quite clear that the hegemony of discourses generally depend on ideological views. Again, we revert to some prevailing stances of the AI-boosting industry (see Purdy & Daugherty, 2017): From an economic view, this is certainly plausible, but it does not rule out the awareness that those arguments are more or less guided by practical interests and not by critical analyses.

2. What is artificial intelligence?

We argue that definitions of AI tend to be philosophically more or less problematic. We also need strong AI to deal with fully-fledged human intelligence. To illustrate our first point, we quote from the popular website 'Technopedia' (see Jansen & Janssen, n.d.):

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2) See e.g. the foreword, written by Sir Michael Barber (Luckin et al., 2016, p. 9), who points out: 'Funders and founders, policy makers and philanthropists – in fact, anyone who takes seriously the urgent need to embark on the next stage of education system reform – should read and debate this paper. Only then will we (finally) make good on the promise of smarter technologies for learning (and, as a side effect, get rid of those boring slides).' This quote certainly is enthusiastic towards claims of AI, such as delivering 'smart' devices or even 'smarter' technologies. But exactly this attitude has to be on trial.

> Strong artificial intelligence (strong AI) is an artificial intelligence construct that has mental capabilities and functions that mimic the human brain. In the philosophy of strong AI, there is no essential difference between the piece of software, which is the AI, exactly *emulating the actions of the human brain, and actions of a human being, including its power of understanding and even its consciousness*. [My italics; TS]

As always, the devil is in the detail: What does 'essential difference' mean? We will argue that consciousness is beyond the scope of strong AI and that this definition implies a version of 'brainism'. Now, brainism relies on the following assumptions: A) The brain is the hardware. AI functions as some kind of software analogous to any software that runs in the brain. B) The brain thinks! C) My individual mental states are constituted by 'states, events and processes' (Bakhurst, 2008, p. 415). Technopedia continues as the following:

> Strong artificial intelligence is more of a philosophy rather than an actual approach to creating AI. It is a different perception of AI wherein it equates AI to humans. It stipulates that a computer can be programmed to actually be a human mind, to be *intelligent in every sense of the word, to have perception, beliefs and have other cognitive states that are normally only ascribed to humans*. [My italics; TS]

Again, it is highly problematic if we can rationally ascribe all cognitive states of humans to strong AI—e.g. being a person, having a sense of beauty (see Berger in this volume), or having practical reasons in a Kantian notion (see Schönecker in this volume).

We will now argue why brainism leads to a distorted view of AI (Section 2.1) and then move to argue in favour of the plausible definitions of weak and strong AI (Section 2.2).

2.1. Against brainism: Brain states and artificial intelligence

It certainly matters if and how AI is related to intelligence in general. Intelligence—whatever it exactly means—is closely related to brain processes. But this does not imply that a) intelligence can be equated with brain processes or b) that brain processes constitute (in the sense of build/cause/lead to) intelligence. For education, it would be a kind of confession of failure, if we, as educators, can simply train brains.[3)]

Interdisciplinary efforts of understanding how the brain works clearly must not foster a hasty conclusion that neurology or psychology alone can explain what it means to be intelligent. As we mentioned above, the status of AI as being a person is very complicated. To illustrate the point why brainism is a failure, we refer to Hacker, Bennett (and to Wittgenstein). If we opt for a version of personalism, we agree on that persons think, learn, and make 'psychological ascriptions' (Bakhurst, 2008, p. 420). What we presuppose without further explanation is that psychological ascriptions are inevitably important in many educational processes. So, what does it mean to ascribe psychological states to the brain (or not)? First, this is not a matter of facts (e.g. how the brain works). Rather it is, according to Bennett, Hacker and Wittgenstein, a 'conceptual issue that precedes empirical enquiry' (Bakhurt, 2008, p. 420). The meaning of something like 'I perceive X' and the meaning of expressions in general are 'determined by the conditions of its se' (Bakhurst, ibid.). Furthermore, the rules of

3) 'The substance of mind is always the life-activity [of a person] . . . and the brain with its innate structure is only its biological substrate. Therefore, studying the brain has as little to do with studying the mind as investigating the nature of money by analyzing the physical composition of the material (gold, silver, paper) in which the monetary form of value is realized' (Ilyenkov, 2002, p. 98). (cited in Bakhurst, 2008, p. 417)

using expressions do not refer to what is going on in the brain. We simply do not have to know what is happening in our brain when we are performing psychological ascriptions (as persons). This is no new insight, but it has to be stressed that Aristotle had already argued that we can be fully aware of our psychological states and at the same time do not know anything about the functioning of our brains.

If personalism is correct and if AI systems show no fully-fledged personhood, then AI has to cope with basic limitations. We will revert to this point in Section 4.

2.2. Weak AI and strong AI

Definitions of AI are, of course, highly disputable (see e.g. Luckin et al., 2016, p. 14)[4]. We think that such a definition should differentiate between strong and weak forms of AI, where strong AI implies systems (e.g. machines) with *minds* and weaker forms of AI only try to simulate intelligent behaviour like problem-solving (Arkoudas & Bringsjord, 2014). The Turing test is often regarded as a litmus test for *weak* AI.

> TT [Turing Test; TS], TTT [Total Turing Test; TS], and various other tests, [···] it can be safely said that we are dealing with *weak* AI. Put differently, weak AI aims at building machines that *act* intelligently,

4) Luckin et al., 2014, state: 'Another reason for the difficulty in defining AI is the interdisciplinary nature of the field. Anthropologists, biologists, computer scientists, linguists, philosophers, psychologists, and neuroscientists all contribute to the field of AI, and each group brings their own perspective and terminology. For our purposes, we define AI as computer systems that have been designed to interact with the world through capabilities (for example, visual perception and speech recognition) and intelligent behaviours (for example, assessing the available information and then taking the most sensible action to achieve a stated goal) that we would think of as essentially human.'

> without taking a position on whether or not the machines actually *are* intelligent. (Arkoudas & Bringsjord, 2014, p. 35)

Though we argue in Section 3 that weak AI can fulfil many requirements of education, we argue in Section 4 that we should consider the fact that even strong AI systems are not adequate for some educational purposes. We think that with respect to the characteristics of and theoretical insights into the philosophy of education, we should strive for strong AI (Arkoudas & Bringsjord, 2014, p. 35f.).

So, what is strong AI? The main point is that it might be impressive to simulate intelligent behaviour, but the goal of AI is, in the final analysis, much more ambitious. It aims 'at machines with *minds,* in the full and literal sense' (Arkoudas & Bringsjord, 2014, p. 35).[5] Of course, it is dubious whether AI in this notion is actually realized or will be realized in the future. For the purpose of this paper, we consider strong AI to be a system with a mind that has to be human-analogous intelligence. It will show the following features:

- Concept of a first-person perspective (Example: 'I now do X')
- Personhood (modes of being a human being. Examples: having emotions, feelings, perceptions, corporeality)
- Intentionality ('I as the initiator of Action X will conduct X')
- Self-consciousness (A self-conscious subject is aware of themselves *as themselves. Example: 'I see* myself performing X and I know that I do X. *I* know that it's *me* doing X')

To illustrate what it means that machines have 'minds, in the full and literal sense' (Arkoudas & Bringsjord, 2014, p. 35), we will point to some aspects that are implied by the above-mentioned characteristics

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5) For definitions of strong and weak AI, see also Patterson, 2010, pp. 549f.; Russell & Norvig, 2016, pp. 1ff. for a broader overview on AI topics see pp. 1 – 33.

of strong AI:

First-person perspective means that an AI system can actually think and act as a person-like system. It makes a fundamental difference—e.g., robots interact with human beings, but they have no idea about the fundamental difference (transcendentally or phenomenologically speaking) between this ontologically and epistemologically privileged access to mental states via the first-person perspective. Since all the four aspects are intertwined, we can assume that *personhood* encompasses being able to adopt a first-person perspective. Since a lot of effort has been made to simulate or create personhood features in the literal sense (see e.g. Penstein Rosé et al., 2018), we stress that personhood implies having—i.e. to experience emotions—to feel something in a certain way, to perceive in manifold ways, and to be a corporeal being or living body. According to phenomenology, we have also examined the body of lived experience (German: Leib).[6] This two-fold human body—in accordance with the phenomenological notion—enables us to realize modes of social behaviour as a characteristic inherent to human beings.[7]

One main relation of *Intentionality* and *Consciousness* can be, in a nutshell, grasped as the main concept that explains 'for what it is to have a mind' (Siewert, 2017). While '[i]ntentionality is the *aboutness* or *directedness* or *reference* of mind (or states of mind) to things, objects, states of affairs, events' (Siewert, 2017; Italics in original), consciousness 'is a feature that makes certain states count as experience' (Siewert, 2017) in the following sense. Among others, having experiences of 'sensory states, imaginary, episodic thought, and emotions' (ibid.) are

6) This two-fold nature of the body is, as far as we see, no in the realm of strong AI.

7) It is far from being clear how phenomenological insights, such as living and acting in experience in a lifeworld ('such as the experience of lived time, lived space, lived body, and lived human relation') (van Manen, 2016, p. 18) can be realized in AI systems.

typical examples that count as conscious states. With respect to AI, we assume that—since self-consciousness is regarded as a higher order of consciousness—in terms of the characteristics of the mind, AI systems should not only have experiences like seeing something and explaining that it looks like 'something' to 'them'. This would not be enough—self-consciousness aims at being a subject that sees themselves as themselves.[8] In conclusion, one central problem for strong AI—at least in the concept of the embodied AI—is evident:

> A dominant and recurrent theme has been the conviction that genuine understanding will never be attained by taking something that is dynamic and evolving, reactive, plastic, flexible, informal, highly nuanced, textured, colorful, and open-ended; and modeling it by something static, rigorous, unbending, and inflexible – that is, essentially by replacing something alive by something that is dead (Arkoudas & Bringsjord, 2014, p. 57)

We do not claim that AI systems do *not* have intelligence at all in this very strong notion. We have strong evidence that these strong AI systems are not realized or even conceptualized by computer specialists, computational neuroinformatics, and other AI specialists. The strength of my argument rests on the assumption that only strong AI can cope with some of the elementary problems of education in an admittedly ambitious meaning. I do not claim that only human beings per se are endowed with certain characteristics that strong AI cannot ever have (e.g. logical

8) 'But a self-conscious subject is not just aware of something that merely happens to be themselves, as one is if one sees an old photograph without realising that it is of oneself. Rather a self-conscious subject is aware of themselves *as themselves*; it is manifest to them that they themselves are the object of awareness. Self-consciousness is a form of consciousness that is paradigmatically expressed in English by the words "I", "me", and "my", terms that each of us uses to refer to ourselves *as such*' (Smith, 2017).

reasons) (see Heslep, 2009). To avoid common counterarguments—e.g. the argument of technophobia (Anderson, 2018) or a general misconception about AI applicability in classroom settings—I will list a few merits of AI systems which would be helpful to initiate, to control, and to develop teaching and learning.

3. Why artificial intelligence systems are helpful for educational purposes

We list only a few functions of AI in classroom settings without further explication[9]: a) AI may improve communication skills; b) AI helps to gather information; c) AI helps to design curricula; d) AI helps teachers to grade their students/pupils; and e) AI helps to promote communication. Here is a quite euphoric quote:

> Students and teachers will be able to communicate instantly with one another as well as to connect with other forms of AI around the world. Students instantly paired with peers, helping each student to expand their own personal learning networks, with personalized and more authentic connections that will meet the students' interests and needs at any given moment. (Dene Poth, 2018)

9) For the relevance of 'Digital philosophy', i.e. aspects of digitization, see Lewin & Lundie, 2016. For ethical concerns against unlimited application of robots, see Sharkey, 2016, p. 295: 'The use of fully fledged robot teachers (the extreme of Scenario 1) is surely something that should not be encouraged, or seen as a goal worth striving for. There seems no good reason to expect that robot teachers would offer extra educational benefits over a human teacher.' For applications of robots in education see e.g. various contributions in Oliveira, Gama, Vale, & Lopes Cardoso, 2017; Leite, Martinho & Paiva, 2013.

This statement clearly indicates technophilia, which happens to be a worldview that sees all new technology as inherently positive and beneficial to human life. But without doubt, a revolution in communication enables faster and personalized dissemination of detailed and relevant information to students.

b) With respect to the assessment and exploration of scenarios (e.g. three-dimensional simulation of historical places), weak AI is in some respects superior to the skills of human teachers (Dene Poth, 2018; Flagella, 2017). Simulations of real places, architectures, buildings, and landscapes for educational purposes are much more precise than, for example, drawings by teachers.

c) AI systems can compare different goals and aims of curricula and implement educational desires such as acquisition of competences, clear structure of learning modules etc. (see Koedinger, Anderson, Hadley & Mark, 1997)

d) The grading software is more objective than teachers. AI can collect and disseminate more information[10] in a more precise manner with respect to pupils' individual needs and their individual potential (Sidorkin, 2011, p. 523) than teachers could ever do (Dene Poth 2018). For all these purposes and many more applications, weak AI is intelligent enough. But weak Ai is clearly not adequate for all educational purposes, goals, situations etc.

10) Against the view that datafied approaches are some kind of magic bullet in pedagogy, see Lundie, 2016.

4. An argument against replacing human beings in education

We will first summarize an ambitious multidisciplinary concept of education (Section 4.1) and then elaborate an argument that will show some basic and general limitations of AI systems in the context of classroom settings (Section 4.2).[11]

4.1. Remarks on what education should be

The strength of my argument (see Chapter 4.2) rests very much on a highly elaborated notion of education—i.e. in a fully-fledged and philosophically reflected way. Briefly, education[12] is more than A) a highly complex process of teaching and learning in the sense that it cannot be reduced to these important factors of education (Vanderstraten & Biesta, 2006). B) Education is not training or skill-acquisition, performance, or whatever the output may be (Biesta, 2012, pp. 35f.). It is almost superfluous to say that education is sometimes related to elements of teaching like 'Teacher A influences pupil B in a way that B can perform better, e.g. can solve a mathematical problem or can improve his literacy in terms of improved grammar, treasury of words etc.'[13] C) Education is partly no subject of exact measurements in terms

11) For general limitations of deep learning algorithms see e.g. Ray, 2018. Ray stresses, that e.g. AI systems of this architecture are limited with respect to dynamically changing problems.

12) I cannot focus on goals of education in general. According to Hand (Hand, 2014, p. 31) it is dubious if we should determine aims of educations independent of concrete situations (see e.g. Dewey as a paradigmatic author of this view). But this does not rule out a position that education in general strives for basic goals

of empirically accessible parameters.[14)]

So, what is education and what should it be? I can only sketch some tendencies and restrict myself to the following shortcomings of many curricula: Firstly, the role of the teacher is entirely different from a 'facilitator'.[15)]

> Secondly, while the teacher is not the only one who should be engaged with questions about educational purpose, the teacher nonetheless plays a crucial role because at the end of the day judgements about what is educationally desirable can only be made in response to the concrete and always unique situations that emerge from the encounter between teachers and their students. (Biesta, 2012, p. 40)

The implications of this view are, among others, I) Fragile, dialectical processes of interactions of teachers with students have to be regarded as crucial. Every situation is unique and every lesson is unique. Of course, learning targets can and should be formulated and adjusted; all outcomes can be standardized. But individual persons can per se not

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13) See many classics of Philosophy of Education (Ladenthin, 2007; as locus classicus see e.g. Mason, 1954 and phenomenological and pragmatist account in philosophy of education).

14) Without doubt, many feature of education are empirically accessible, but the following characteristics are not: Search and relevance for Padeia (Kato, 2014) or 'Bildung' in the sense of 'the inner development of the individual, a process of fulfillment through education and knowledge, in effect a secular search for perfection, representing progress and refinement both in knowledge and moral terms, an amalgam of wisdom and self-realization' (Reichenbach, 2014, p. 86, who refers to Watson, 2010, pp. 53f.))

15) 'The quickest way to express what is at stake here is to say that the point of education is never that children or students learn, but that they learn *something*, that they learn this for particular *purposes*, and that they learn this from *someone*. The problem with the language of learning and with the wider "learnification" [···] of educational discourse is that it makes it far more difficult, if not impossible, to ask the crucial educational questions about *content*, *purpose* and *relationships*. Yet it is in relation to these dimensions, so I wish to suggest, that teaching matters and that teachers should teach and should be allowed to teach' (Biesta, 2012, p. 36).

be standardised. They are simply too complex. II) It is crucial that the concrete atmosphere of interacting human beings cannot be predicted and therefore pedagogical intuitions, humour, improvisation, charisma, rhetorics etc. are inevitably intertwined and may help to cope with difficult situations (such as classroom disturbances).

Thirdly, education is or is at least partly directly connected to a notion of 'Bildung': 'The educated person relates the legitimate demands of our world to one another as well as the purposes being valid and established' (Ladenthin, 2007, p. 96). Further aspects of education are more precisely elaborated in the next subsection.

4.2. An argument against unlimited applicability of AI systems in classroom scenarios

The following premises are indispensable for my argument: a) Though it is ethically disputable if and how non-human AI agents should replace teachers (see e.g. Serholt et al., 2017), I assume, for the sake of the argument, that ethical objections pertaining to the use of robots in classroom settings may be resolved. b) There is a deep gulf between the AI systems that *simulate* a human capability such as empathy—the teacher's authority, openness, and receptiveness—and *real* empathy[16],

16) I would like to distinguish between 'real empathy' and 'simulated empathy'. E.g., Robots might simulate empathy and especially younger children—such as toddlers—feel and interact with robots as if these systems really were empathic systems. One might object that a perfect simulation of empathic attitudes is all we strive for in education. The key argument is, that whatever empathy exactly is, it rests on the ability to feel and *express feelings* in a fully-fledged way towards *persons*. Even strong AI systems fail to have feelings in the following notion: They are not able to express something like 'I as a person p now feel a.' in comparison and in contrast to human beings.

among others. From a phenomenological point of view, young students feel these differences. Again, this does not exclude systems that simulate empathy from its being used in classrooms. I only argue that as human beings we feel and perceive the evidence of someone who shows empathy and who we identify as one of our own kind. c) Some dimensions of human acting (as a teacher) can only be conveyed by real human beings. To avoid a petitio-conjecture, I will explain why (b) is a proper assumption. One example: At least from a phenomenological point of view, there is a clear difference between a person educating pupils/students with his 'pedagogical eros' and robots (partly against this view, see Tanaka, Cicourel & Movellan, 2007).

Just to foster my argument that robots are different from real persons, I refer to Biesta (Biesta, 2012). According to his view—a view that can be traced back at least to 18th century philosophy of education—teaching cannot be reduced to matters of control. The pupil sometimes has to be treated as a subject in his/her own right that obtains acceptance as a subject by the teacher. We need a kind of transcendental move for initiating this subject–subject relation between the pupil and the teacher.

The world and the subject are not simply there! The fulfilment of the possibility conditions for accepting each other as subjects is, so far as I see, not in the realm of computers.

In conclusion, I state that if a) to c) are correct, then AI cannot educate pupils/students in many respects in the full meaning of upbringing and education as 'Bildung'.

To strengthen my argument, I will focus on the basic aims and goals of education (see e.g., Biesta, 2012; Vanderstraeten & Biesta, 2006). Before I do this, I would like to mention—without further elaboration—that my argument can be derived from renaissance philosophy—mainly from the theory of Erasmus of Rotterdam. In a

nutshell, Ladenthin summarizes one of Erasmus's goals of education:

'The educated person relates the legitimate demands of our world to one another as well as the purposes being valid and established' (Ladenthin, 2007, p. 96). Moreover, irreducible to economic, social, or political factors, an individual creates meaning in this whole process (including the process of education as 'Bildung' and upbringing as well as the process of learning).

More precisely, the educated human being can adjust and balance in the following way: He/she can compare the world's claims with his/her own claims to distinguish between justified and non-justified claims. To give you one example: Pupils learn that purely egoistic behaviour is under a maxim of prudence inadequate. Some scenarios of everyday life demand actions (even in a pre-ethical view) that are more or less altruistic. We simply learn to care for each other. We also learn at the same time that some of the claims raised by other persons are rather exaggerated, misleading, etc. Some of these claims are translated into purposes (ends in itself and ends that have meaningful end-structures). These purposes are put into meaningful relationships by the self-activity of an individual. Irrespective of its nature, an ambitious notion of education rests on the assumption of creating and recognizing meaning. 'Meaning' covers all the relevant realms of typical human flourishing and the typical human being.

The self-activity of pupils/students demands certain capacities and certain characteristics like 'how it feels to have perceptions/reflections in and from a potentially meaningful world'.

If you agree with this point, computers and other AI systems ('rule-learners' through algorithms and deterministic processes) are no appropriate candidates for

1. being full-fledged individuals (they do not have self-consciousness

and cannot think in the way, for example, Descartes evolved his 'Cogito Argument')

2. having experiences of meaning (of the world/of life/of successful and unsuccessful actions in this world in a phenomenological–existentialistic notion)
3. showing self-directed autonomy.

Ad 1: Even if we are anti-Cartesians, something like 'I think and I know that I think' is not accessible or simply beyond the realm of AI (as we have grasped it in Section 2.2). Self-consciousness resists on the rationality, personhood, consciousness and awareness of other minds (Smith, 2017). We restrict ourselves to one aspect of personhood. Since personhood might imply to have bodily self-awareness (Gallagher & Zahavi, 2014), even if we concede that embodied AI could partly simulate bodily states, they are simply no systems that have 'Leib' (German term) and 'Körper' (German term) in this notion:

> The claim is not simply that the perceiver/actor is objectively embodied, but that the body is in some fashion experientially present in the perception or action. Phenomenologists distinguish the pre-reflective body-awareness that accompanies and shapes every spatial experience, from a reflective consciousness of the body. To capture this difference, Husserl introduced a terminological distinction between *Leib* and *Körper*, that is, between the pre-reflectively lived body, i.e., the body as an embodied first-person perspective, and the subsequent thematic experience *of* the body as an object [···]. (Gallagher & Zahavi, 2014)

AI systems have, as far we see, simply no 'pre-reflectively lived body' (see above). They lack the experience 'of the body as an object' (see above)

Ad 2: Experiences of creating and experiences of meaning in the phenomenologist-existentialist notion imply that an individual knows and anticipates how it is like to fail in manifold ways. Our communication sometimes fails: We do not achieve our goals, we are not able to understand a question etc. 'Meaning' is more than just ascribing meaning to something, most prominently to our lives as a whole. 'Meaning' is something that we experience through our human condition (Latin: conditio humana). Whatever be the essence of human beings, one notion is that we are as finite, limited, and mortal human beings forced to create our own multi-levelled meanings. Obviously, AI systems are ontologically different. They do not know, and they cannot know how it feels to be exposed to these human constraints.

Ad 3: Self-directed autonomy (in the notion of the self-initiation of the intentional processes of an autonomous subject) implies that education is a fragile process that could either be successful or unsuccessful. Education can be entirely and intrinsically unsuccessful because in some respects self-formation processes and self-perfection processes are extremely complex. Of course, educational processes like knowledge acquisition can be promoted and operated by AI systems. Education has elements that cannot be translated into algorithms. Exactly why is that? A person seems to be able to initiate volitional acts spontaneously. Robots have per se no free will. Again, we could simulate free will.

Finally, here is a sketch of a further line of argument: AI systems have no feelings. If AI systems only follow rules, and, as Larissa Berger[17] argues, there are no rules of taste determining which objects

17) See Berger's contribution in this volume. For the sake of brevity, I have left some further presuppositions of this argument aside. But judgements and perceptions/feelings of beauty are obviously relevant in education.

or properties of objects are beautiful (e.g. ‘All symmetric objects are beautiful’). Also, if solely following rules are principally not enough for successful educational processes, then AI systems cannot judge, for instance, on beauty. Thus, in conclusion, even strong AI cannot appropriately perform some basic educational tasks and activities.

5. Concluding remarks

To sum up, we first insist that many discourses in the field of AI applicability in educational contexts are explicitly or implicitly guided by ideological presuppositions that can be labelled as technophobia or technophilia. These presuppositions must be unfolded and they have to be reflected upon. Since definitions matter with respect to conceptualizing, using and evaluating AI systems in classroom situations, we suggest that some prevalent definitions of strong AI already indicate how limited even strong AI, in comparison to fully-fledge human intelligence, is.

The division of AI into weak AI and strong AI allows us to recognize the merits and benefits of AI systems for educational purposes. Weak AI is widely applicable for the technical aspects of education. Weak AI systems can achieve valuable goals in classroom settings; they have superior capacities compared to human capacities in some respects.

Nevertheless, we should keep in mind that the use of AI has some fundamental limitations if we assume a broad and ambitious notion of education. Thus, the existence of teachers, i.e. humans, happens to be, as far as the readers will follow our analysis, on the one hand quite indispensable. On the other hand, from our point of view, there is no need to deny the usefulness of AI for educational purposes as far as it helps to achieve its intended purposes.

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