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ORIGINAL ARTICLE

AI and education: the importance of teacher and student relations

Alex Guilherme[1]

Abstract A defining aspect of our modern age is our tenacious belief in technology in all walks of life, not least in education. It could be argued that this infatuation with technology or 'techno-philia' in education has had a deep impact in the classroom changing the relationship between teacher and student, as well as between students; that is, these relations have become increasingly more I–It than I–Thou based because the capacity to form bonds, the level of connectedness between teacher and students, and between students has either decreased or become impaired by the increasing technologisation of education. Running parallel to this and perhaps exacerbating the problem is the so-called process of 'learnification', which understands that teachers are mere facilitators of the learning process, rather than someone with an expertise who has something to teach others. In this article, I first assess the current technologisation of education and the impact it has had in relations within the classroom; second, I characterise Buber's I–It and I–Thou relations and its implications for education; finally, I investigate through a thought experiment if the development of AI could 1 day successfully replace human teachers in the classroom.

Keywords Martin Buber · Teacher–student relations · Learnification · Techno-philia

1 Introduction: technologisation of education

The connection between technology and education is usually very complex and multifaceted because of the political, economic, social, and pedagogical implications that the use of technology has in education.[1] Generally speaking, it is understood that given that we live in 'technological societies', we must use technology to help with teaching and learning tasks, and learning about and using technologies must be an important part of the curriculum. This means that the development of technologies and programmes that fully support pedagogical ventures should become an imperative, because this will lead to general improvements in education. It is also understood that the technologisation of education will support students who often feel disadvantaged by the traditional educational system, improving their performances through access to computers and internet (Laura and Chapman 2009: 289). That said, it must be noted that there is another school of thought, "the Luddite, [which is] not open to innovation of even the most benign sort" (Kritt and Winegar 2007: 3), favouring the maintenance of traditional methodologies and approaches to education. These characterisations might seem generally unfair because they do not capture nuances, but they do demonstrate an ultimate difference in values (Kritt and Winegar 2007: 3) about the importance of technology for education.

✉ Alex Guilherme
alexandre.guilherme@pucrs.br

1 Postgraduate Programme in Education, Pontifícia
   Universidade Católica do Rio Grande do Sul, PUCRS,
   Porto Alegre, Brazil

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[1] For instance, the issue of 'technological inclusion' of individuals through education has deep social, political and economic effects, such as individuals being fit to join the labour market and contribute to the economic development of societies; likewise, 'technological exclusion' present us with serious social, political and economic problems, such as unemployment. In addition, the use of technology in education may change educational contexts, their geography, as well as the dynamics between individual.

However, it can be argued that it is not a matter of discussing education with or without technology, because even a pencil and a piece of paper are technologies; they are so ubiquitous in our lives that we tend to forget that they are technological devices. The difference in values about the importance of technology for education concerns the new technologies, the computer, the internet, which have been embraced by schools and universities throughout the world in past decades. This rapid increase in the use of new technologies in education "is definitely not what one would call a slow movement" (Apple 1988: 151). These changes in schools and in educational systems which are associated with a notion of progress and this might lead us to ask questions, such as: "Whose idea of progress? Progress for what? And fundamentally…who benefits [from this progress]?" (Apple 1988: 151). These are important questions connected to the political economy of education, but it is just as necessary to ask other questions directly connected to changes in the classroom and within the school setting.

This hegemonic trend focusing on the importance of technology for education has had a direct impact on teachers and teacher education, because they are expected to combine students' and their own development of (1) "basic skills" and (2) "creativity and intellectual excellence within a globally technological and economically demanding society" (Laura and Chapman 2009:290). However, "skills-based training, combined with ever growing technologies, have overshadowed personal creativity, humour, imagination, intellectual excellence, dialogue, collaborative learning, compassion and spiritual sensitivity, which, in turn, has diminished our educational purpose" [as teachers] (Laura and Chapman 2009: 290). Thus, the tension between the development of basic skills *and* of personal excellence has not been resolved successfully within the current educational context.

This means that the technologisation of education has had a deep impact on teachers and teaching because of its focus on education as *Erziehung*, or education as the learning of a skill or trade, to the detriment of education as *Bildung*, or education as character formation. It is arguable that this has serious implications for the social, political, and ethical spheres of education, because it interferes directly and negatively with the individual's capacity to be someone who is concerned for others in the community, who engages with the various problematic issues of society, and who is aware of the impact of actions upon himself or herself, others, and society as a whole—that is, the *Bildung* aspect of education. This is something discussed by Buber who understood that instruction is a relatively easy task, since one can teach individuals to perform various tasks (e.g., solve equations; mix compounds) successfully; however, character formation can never be accomplished simply through instruction. Weinstein (1975: 46) notes that:

Buber related a personal anecdote when he once tried to give instruction on honesty: the worst habitual liar of the class produced a brilliant essay on the destructive power of lying. He confessed that he made a fatal mistake of giving instruction in ethics. What he said was accepted as current coin knowledge, but nothing of it was transformed in character-building substance.

I note that intrinsically connected to the above is the pedagogical shift from teaching to learning, the so-called process of 'learnification', which promotes the idea that teaching should be primarily concerned with the creation of rich learning environments that are very often supported by various technologies, such as the use of computer programs and internet connection, to aid scaffolding learning (e.g., a computer program to help with the learning of 'Logic' or 'Ancient Greek'). In doing so, this process of 'learnification' has also attacked the idea that "teachers have something to teach and that students have something to learn from their teachers" (Biesta 2010, 2013: 451). The influence of constructivism, and thinkers like Vygotsky and Bruner in this paradigm shift is quite evident; however, this gives rise to a tension in what a teacher is and what teaching entails, because the teacher, by definition, is someone who has something to teach students, and not merely a facilitator of the learning process (cf. Guilherme 2014: 252–253). In connection to this, Guilherme (2014: 256) argued that:

Buber suggests that there is something that is essential to education; that is, the act of teaching must fundamentally entail *revealing* something that was *hidden* from the student, the other… It is important to note… that this *revelation* does not occur just at the *Erziehung* level when the student in a 'eureka' moment grasps how to perform a task successfully (e.g., how to do additions), it also happens at the *Bildung* level, when the individual understands the importance, the ethical weight, of being a moral being (e.g., the serious consequences of lying).

Hence, I argue that as a consequence of the diminished understanding of education as *Erziehung* because of both the technologisation trend and of the failure to appreciate the importance of the role of the teacher and of teaching due to the learnification process, there has been a significantly negative impact on the relations between teachers and student, and between students, in education. I believe that this is something that is often overlooked by both educators and policy makers.

Several studies have established the importance of the quality of relationships between students and teachers for issues of personal self-esteem, motivation to learn, and confidence in facing new challenges, all of which play a crucial role in overall academic achievement (Laura and Chapman 2009: 290). For instance, McDevitt et al. (2013:15; 456) note that:

[R]eciprocal relationships exist between children and their environments… [I]f parents and teachers develop mutually respectful relationships, they may exchange information and together reinforce their support for a child. If parent–teacher relationships are poor, they may blame each other for struggling child´s limitations, with the result that no one takes responsibility to teach the child needed skills…. [Further], when caregivers are kind and responsive, children begin to trust them and gain confidence in their own abilities. We learn that good relationships help children express their emotions productively and blossom into healthy, one-of-a-kind personalities. Finally, we see that educators can contribute immensely to children's healthy emotional development.

It is thus very ironic, given that relationships are something very important in education, that the impact of the technologisation of education and its potential depersonalisation of the classroom is not discussed in more detail and philosophically questioned. It seems that in some quarters, we have been too ready to accept the successes of technology in education, because it is very much part of the hegemonic discourse without being critical about it, without questioning its possible hindrances, and this might be the case, because it is possible that technology has become the very standard for measuring progress and success, and therefore, the appropriate way of resolving problems, includes pedagogical ones (cf. Laura and Chapman 2009: 291). In connection to this criticism, Warschauer et al. (2004: 584–585) noted in a study on computer and internet connections in American schools, particularly in low-SES schools, that:

[T]here is no single digital divide in education but rather a host of complex factors that shape technology use in ways that serve to exacerbate existing educational inequalities. We found effective and less effective uses of information and communication technologies…in…schools. At the same time, we found no evidence to suggest that technology is serving to overcome or minimize educational inequalities within or across the…schools we examined. Rather, the evidence suggests the opposite: that the introduction of information and communication technologies in the…schools serves to amplify existing forms of [educational] inequalities.

Before proceeding with the development of my argument I wish to emphasise that the position I am defending in this article *is not* that 'we should not be using technology to aid teaching and learning in the classroom'; rather, the point I am making *is* that 'we should not overlook the importance of relations between teacher and student, and between students in the classroom'. I note that some would argue that technology makes communication between individuals faster and easier by providing a whole range of options on how to communicate and connect individuals.

However, there remains a question over the *kind* of relationships that are being established, and thus I believe that Buber's I–It and I–Thou relations are of great help to us in explicating the issue of the importance of the right kind of relationships in education (i.e., I–Thou rather than I–It), and it is to this that I now turn my attention.

2 Buber's *basic words* I–It and I–Thou

What are I–It and I–Thou relations? In his seminal work, *I and Thou* (1923, 2004) Martin Buber established a taxonomy describing the kinds of relationships in which people engage. According to Buber, human beings possess a twofold attitude indicated by the *basic words I–It* (Ich–Es) and *I–Thou* (Ich-Du). The *basic words* are a "linguistic construct created by Buber as a way of pointing the quality of the experience that this *combination of words* seeks to connote" (Avnon 1998: 39) [*my emphasis*], so that I–It and I–Thou are read as 'unities' indicating one's state of Being and attitude towards the *Other*, the *World* and *God*. This means that there is no *I* relating to a *Thou* or to an *It*; rather, what exists is a kind of relation encapsulated by the unification of these words. Avnon (1998: 40) comments insightfully that "one may summarize this point by suggesting that the difference between the I–You [I–Thou] and the I–It relation to being is embedded in the hyphen". The hyphen of I–Thou indicates the kind of relation that is inclusive to the other whilst the hyphen of the I–It points to the sort of relation that is not inclusive to the other, that in fact separates the other. As Buber (1923; 2004: 4) says: "There is no I taken in itself, but only the I of the primary word I-Thou and the I of the primary word I-It…when he says Thou or It, the I of one of the two primary words is present".

The I–Thou relation is an encounter of individuals who recognise each other as such. It has been described as a *dialogue* and an *inclusive* reality between individuals, a reality in which one makes space for the Other to be who he or she is. Thus, it is important to note that any sort of pre-conception, expectation, or systematisation about the other prevents the I–Thou relation from arising (cf. Theunissen 1984: 274–275), because they work as a 'veil', a barrier to being *inclusive* towards the other. Examples of I–Thou relations in our day-to-day life are those of: two lovers, two friends, a teacher, and a student.

Contrasting to this is the I–It relation, in which an individual confronts another individual, and objectifies him or her. That is, the individual fails to establish a *dialogue* and to be *inclusive* towards the other, and in doing so *separates* himself or herself from the other. As Avnon (1998:39) notes, the "'I' of I-It relations indicates a separation of self from what it encounters" and "[b]y emphasising difference, the 'I' of I-It experiences a sensation of apparent

singularity—of being alive by virtue of being unique; of being unique by accentuating difference; of being different as a welcome separation from the other present in the situation; of having a psychological distance ('I') that gives rise to a sense of being special in opposition to what is".

For Buber, there is always an *interplay between* the I–Thou and the I–It rather than an *either-or* relation between these basic words. The I–Thou relation will always slip into an I–It relation, because it is too intense, but the I–It relation has always the potential of becoming an I–Thou relation. This oscillation is very significant for it is the source of transformation, because through every I–Thou encounter, the I is transformed and this affects the I's outlook of I–It relations and of future I–Thou encounters. This transformative aspect of I–Thou relations is sometimes difficult to fathom; however, and on reflection, when we look back into our lives, we can easily pin point particular individuals, specific encounters, that have changed our outlook on life, that have changed us in one way or another. Thus the importance of I-Thou relations for transformation and personal development.

Buber's views on relations have implications for education, and *The Address on Education* (1925, 1961a) and *The Education of Character* (1939, 1961b) are some of his most important texts in this area. Buber argues against both teacher-centred education (top–down or as Buber says *'funnelled in'*) and student-centred (bottom–up or as Buber says *'pumped out'*) which were being discussed at the time; that is, in teacher-centred education the teacher has all the authority and knowledge, seeking to mould the student in accordance with a pre-established norm, whilst in student-centred education, the students are provided with a rich environment to pursue their interests only occasionally seeking the teacher for advice. For Buber, both teacher-centred and student-centred education remain within the realm of I–It relations, because there is no real *dialogue*, I–Thou relations, between teacher and student, as well as not encouraging this between students. For Buber, what is important in education is that it must be based on *dialogue*; that is, not on any kind of relations, but on the real meeting with the other, on the acceptance of the other, on establishing the kind of connection with other in which the other is treated as a human being, welcoming all diversity. Furthermore, Buber understood that true education is 'the education of character', is directly connected to *Bildung* not *Erziehung*, as the title of one of his most important essays in education suggest; Buber (1939, 1961b: 123) says: "Education worthy of the name is essentially education of character. For the genuine educator does not merely consider the individual functions of his pupil, as one intending to teach him only to know or to be capable of certain definite things; but his concern is always the person as a whole, both in the actuality in which he lives before you now and in his possibilities, what he can become".

This understanding of education would be critical of and has repercussions to the current processes of technologisation and learnification in education, because they tend to overlook the importance of the right kind of relations between teacher and student and between students in education (i.e., I–Thou rather than I–It). Moreover, the technologisation process favours a diminished understanding of education as the mere learning of skills (i.e., *Erziehung*, not *Bildung*), which is a problem compounded by the learnification trend that fails to appreciate the importance of the role of the teacher and of teaching in the educational process. Given this situation, I turn my attention to a thought experiment enquiring if the development of AI would 1 day be capable of fully replacing teachers in the classroom.

3 Thought experiment

Thought experiments are powerful philosophical devices that use the imagination to investigate a whole range of theoretical problems. They are commonly used in philosophy, economics, and the sciences in general. Kuhn (1977: 241; 261) commented that they are "potent tool[s] for increasing our understanding… Historically their role is very close to the double played by actual laboratory experiments and observations. First, thought experiments can disclose… failure[s] to conform to a previously held set of expectations. Second, they can suggest particular ways in which both expectation and theory must henceforth be revised". Thus, through resourcing to thought experiment, I wish to investigate if the development of AI could 1 day successfully replace human teachers in the classroom.

AI research has taken generally speaking two interconnected approaches. The first approach, which is very ambitious, seeks to develop a computer program that successfully mimics human intelligence, and in so doing, it seeks to find explanatory models for human cognition. The second approach is less bold and seeks to develop computer programs that deal with particular problems (e.g., drawing; chess game; learning a language) without referring to models of human cognition, but which nevertheless display highly intelligent behaviour (McCorduck 1988: 68, 1979; cf. also). The former aims to imbue computers with the virtue of intelligence with the objective that the computer might 1 day replace human beings, occupying bureaucratic positions in the armed forces or corporations; the latter envisages developing discreet computer programs that could serve to enhance human intelligence, assisting human beings to carry out certain tasks (cf. Mirowski 2003: 136). This means that AI can be understood in two ways:

1. We can understand AI as a computer program that successfully mimics human cognition—this is that which I call a *thick conception* of AI.
2. We can conceive of AI as a computer program that deals with a particular aspect of knowledge in a highly intelligent way, aiding human beings to perform certain tasks—this is that which I call a *thin conception* of AI.

I note that this contrast between *thick conception* and *thin conception* of AI has different implications for education and I shall deal with these in turn. Let me deal with the *thin conception* of AI first.

The use of computer programs to help with teaching and learning is now quite ubiquitous in certain countries, especially in the global North. These programs have been used to help with a whole range of teaching and learning activities, from aiding with the learning of a particular subject (e.g., 'Logic' or 'Ancient Greek'), to exercise practices and drills (e.g., 'Arithmetic' or 'Geometry'), to formative or summative tests. These are now used at all levels, from primary to postgraduate, and in a whole range of subjects, not just in the sciences but also in the arts and humanities. Many of these programs are AI in essence, fitting the *thin conception*, and working as instrumental tools that help students to learn their subjects (e.g., Arithmetic).[2]

One such early AI program aimed at dealing with a particular aspect of knowledge, which fits the *thin conception* of AI, is AARON, a computer program endowed with ideas about plants, size and shape of human beings, and balance and symmetry in art. This program does thousands of drawings, it knows what it has drawn and will not repeat it unless asked otherwise. AARON was created by the artist Harold Cohen (cf. McCorduck 1988: 65–66), and one could envisage it as being used pedagogically, teaching students about certain aspects of drawing, such as human and plant physiology in art and balance and symmetry in a composition. It is interesting to note that when questioned if AARON is just producing images or really creating a form of art Harold Cohen responds that it is indeed art and comments that: "Within Western culture…we have always afforded the highest level of responsibility—and praise or blame—to the individual who works on the highest conceptual level. We may hear a hundred different performances of a Beethoven quartet without ever doubting that we were listening to Beethoven. We remember the names of architects, not those of the builders who made their buildings. And, particularly, we value those whose work leaves art in a different state to the state in which they found it"

(McCorduck 1988: 81, 1985; cf. also). It is arguable that AARON can only create a particular form of image; that is, it can work only within a set paradigm. Unlike the human being, AARON cannot change its paradigm and develop a new innovative style of producing images; it cannot argue against or accept criticism against its work; it cannot provide a rationale for why it has chosen to produce a particular drawing, for what inspired it to do so, and this makes us question if it is really intelligent.

Similarly, the above criticisms could be raised against AI computer programs currently being used to help with the learning of other subjects such as logic, languages, geometry, and so on. That is, whilst it has been argued that these programs increase contact with the subject, help accessing topics, enable the possibility of doing exercises and drills, facilitate the identification of areas within the subject that require further work, and thus "produce…learning gains… better than classroom teaching alone" (Boulay and Luckin 2015: 6; cf. also; Olney et al. 2012), and they cannot, in the same way that AARON cannot, engage on a real *dialogue* with the student. That is, such programs cannot engage in a real debate over a point of contention, cannot argue against or accept criticism, cannot improvise and pursue a different (and interesting) avenue suggested by students, cannot change its working paradigm.

This means that for the self-taught student using such AI computer programs, the educational experience will be confined to that of I–It relations, because there is no real possibility for I–Thou relations to arise between the student and the computer program, which becomes problematic if we subscribe to an enriched understanding of education. That is to say, education is not just about the learning of a skill (i.e., *Erziehung*) but also about character formation (i.e., *Bildung*). In the classroom, the use of such AI programs would only become problematic if the role of the teacher is undermined, if the teacher is seen as a mere 'facilitator' due to the process of 'learnification' and to the belief that the process of 'technologisation' will eventually provide all the answers. Certainly, some of those who understand that computers and internet are the very expression of progressiveness in education might fail to see this problem because of their belief on the importance of 'rich environments' for students' learning and that the teacher is a 'facilitator' of the process; however, as I have argued, this fails to understand the importance of relationships and human encounter for education. I maintain here that it is not the case that we should not be using technology to aid teaching and learning in the classroom, but at the same time, we should not overlook the importance of relations between teacher and students, and between students in the classroom. I–Thou relations in education must be encouraged and facilitated if the educational process is to be rich, not mere *Erziehung* and developing into *Bildung*, so that teachers and students

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[2] Christensen (1997: 8) notes that the successful use of technology in the classroom is highly dependent on teachers' attitudes towards computer as well as expertise and experience in the use of technology.

understand that their reflections and actions have an impact upon themselves, their societies, and the world.

This brings me to the *thick conception* of AI, a computer program that successfully mimics human cognition, and the thought experiment inquiring if AI could one day substitute teachers in the classroom. Attempts to create such a computer program have so far been unsuccessful, but we could imagine the possible outcomes of a successful program. Sci-Fi literature and cinema can provide us with some useful examples of this kind of AI, and examples of this are *I Robot* (2004), *A.I. Artificial Intelligence* (2001), *Bicentennial Man* (1999), and *Ex Machina* (2015) films. The main robot characters in these films are clearly capable of intelligent behaviour and meaningful interaction with human beings, providing us with fertile ground for our discussion.

In the case of *I Robot*, the robot character is bestowed with internal laws that prevent it ever harming human beings following from the three laws [i.e., (1) a robot may not injure a human being or, through inaction, allow a human being to come to harm; (2) a robot must obey the orders given it by human beings, except where such orders would conflict with the First Law; and (3) a robot must protect its own existence as long as such protection does not conflict with the First or Second Laws (cf. Asimov 1950)]. However, the main robot character in *I Robot* is incapable of emotions, which makes us feel that it is intelligent but not human like. Furthermore, because of the internal laws in its programming the robot is constrained in its capacity to choose otherwise, which contrasts with human beings as we can always choose otherwise, we can choose between A and B, and take responsibility for it, feeling good about our right choices and bad about our wrong ones.

We could envisage a computer program, let us call it T for teacher, which is endowed with the same kind of AI capabilities as that of the robot in the *I Robot* film. T would be capable of displaying perfect intelligent behaviour, of teaching skills extremely well, of interacting meaningfully with its students, but it would not be capable of feeling emotions (which is arguably a major hindrance in the classroom), and of truly connecting with its students through I–Thou relations (which is very problematic in education, at least insofar as *Bildung* is concerned). This is to say, as T is not capable of feeling emotions, it would be incapable of truly empathising with its students in the classroom (e.g., an event has happened and this has had an effect on students) and of reading the mood of the class when teaching and adapting its performance accordingly (e.g., the topic might be considered boring by students and a particular effort to bring them on board might be necessary); these are all part of the "specialized tactics that human teachers apply effectively" in the classroom, which are derived "from the conversational and social interactive skills used in everyday settings such as listening, eliciting, intriguing,

motivating, cajoling, explaining, arguing..and so on" (Boulay and Luckin 2015: 4). Furthermore, as T is incapable of connecting with its students through I–Thou relations, then the kind of education it can provide will always be confined to the learning of a skill, *Erziehung*, and will never be capable of developing into character formation, *Bildung*.[3] On a practical level, and because of the lack of emotions and I–Thou relations, we can envisage T having problems controlling the class through the use of voice (e.g., raising the voice slightly to catch the groups attention), look (e.g., glancing at a particular group of distracted students), and presence (e.g., controlling behaviour and drawing attention through one's own presence in the classroom). This is at the heart of the "impoverished repertoire of teaching tactics and strategies available to" A.I. educational systems "compared with human expert teachers" (Boulay and Luckin 2015:1; cf. also; Carroll and McKendree 1987; Ohlsson 1987; Ridgway 1988).

However, it is conceivable that the AI program could eventually develop in the same way as the main characters in films, such as *Bicentennial Man* (1999) and *A.I. Artificial Intelligence* (2001), and develop emotions and the capacity to engage in I–Thou relations. In this case, it is conceivable that the objections raised above would not apply, but it raises serious questions and challenging problems for AI research, for instance: What is consciousness? What is it to be human? Flood (1951: 34; cited in Mirowski 2003: 137) notes:

[N]obody really knows anything about consciousness. Now, the purpose of Robotology is to take a hard problem, such as this one of consciousness, or a relatively easy one like the learning problem—I can feel the psychologists shudder as I say this—so that a mixed team can be truly scientific in their work on them. Robotology, then, is a way of solving the communication problem in the sense that we do not just let people talk philosophy, or methodology, or just plain hot air; they must talk in terms of something to be put into the design of an object.

The question about the nature of consciousness is very problematic, because as we come to see in *Ex Machina* (2015), the main robot character is so human like that we start to empathise with it, to believe that when we are faced with it, we are faced with someone like us, with an equal.

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[3] I note that some can argue that given that the concept of education as *Bildung*, as character formation, could be used politically and for ideological purposes, then the notion of education as *Erziehung*, the learning of skills is preferable because it would be perceived as being more natural and not political. However, as Paulo Freire taught us 'all education is political' and therefore *Bildung* can be conceived as the formation of critical individuals and citizens, whilst *Erziehung* as a form of 'banking education' and 'domestication of the masses' (cf. Freire 1996).

However, this is just appearances with no substance to it as at the end of the film, we find out that the main robot character only cares for continuing to exist, lacking a moral compass, ethical behaviour and 'humanity'. The crucial issue then is not to successfully 'mimic human consciousness' as happens in *Ex Machina*, but *to find a way of enabling the rise of something like human consciousness in a machine*. If this were indeed to happen, then the objections to an AI program substituting teachers permanently in the classroom would no longer apply as I–Thou relations between teacher and students would become a real possibility. Perhaps, new developments in AI using strategies, such as (1) the observation of human expert teachers, (2) theoretical derivation from learning theories, and (3) empirical observation of human and simulated students, which are used by Artificial Intelligence Educational Programs, such as GURU and INSPIRE (Boulay and Lurkin 2015:2; 6; cf. also Olney et al 2012; Lepper and Woolverton 2002) will lead us in this direction.

4 Final thoughts

In this article, I set out to assess the current technologisation of education and the impact it has had in relations between teachers and students, as well as between students within the classroom. The position I defended was *not* that 'we should not be using technology to aid teaching and learning in the classroom' (otherwise we might still be using just oral skills or wax tablets and stylus); rather, I argued that 'we should not overlook the importance of relations between teacher and students, and between students in the classroom'. There needs to be a balance between the technologisation of education and the provision of the right conditions for I–Thou relations to arise, which is something that educators and policy makers are not always aware. Postman (1995: 171; cited in Laura and Chapman 2009: 293) noted that the introduction of computers and technology in the classroom is an imperative, but when asked the question "[w]hy should we do this?", answer that it is '[t]o make learning more efficient and more interesting'. Such an answer is considered entirely adequate, since…efficiency and interest need no justification. It is, therefore, not usually noticed that this answer does not address the question 'What is learning for?' 'Efficiency and interest' is a technical answer, an answer about means, not ends; and it offers no pathway to a consideration of educational philosophy". This is to say, that education is not solely for efficiency or market sake. These are pragmatic issues that must be considered, but there is much more to education. Education is directly connected to the psychological, social, and political facets of the human being, which can only be truly fulfilled by *Bildung*, not *Erziehung*.

Some would argue that technology in fact facilitates communication between individuals, but this is to misunderstand I–Thou and I–It relationships. Laura and Chapman noted (2009: 296) that "[w]hen people young and old, log on to distant relationships mediated through computer cyberspace, the illusion is fostered that these relationships are comprehensive and deep when in fact they are only a one-dimensional slice of a multidimensional form of human interaction. Loyal friendships and loving relationships depend on bonds of understanding, trust and intimacy, few, if any of which could be satisfactorily provided by a 'single-facet experience' of a multifaceted person". The ease of communication provided by technology does not means that I–Thou relationships are being achieved between individuals just, because individuals are questioning and replying to each other, which can be something merely based on instrumental and objectifying relations (e.g., the need for information); I–Thou relations work on a deeper level, on truly being inclusive and accepting of the other, on allowing the other to be who he or she really is. Educators and policy makers must not confuse the appearance of *dialogue* (i.e., a questioning and answering) with real I–Thou relations, which are based on a real and deep connection between individuals, who respect and accept each other. It can be argued that the crux of the matter is to provide the conditions for educational systems that are increasingly more reliant on new technologies, such as computers and the internet, to change the kind of relations they foster between teachers and students, and between students. That is, these systems must be able to provide the right conditions for I–It relations and *Erziehung* to be transformed into I–Thou relations and *Bildung*.

References

Apple M (1988) Teachers and texts: a political economy of class and gender relations in education. Routledge, London

Asimov I (1950) I, Robot. Gnome Press, New York

Avnon D (1998) Martin Buber: the hidden dialogue. Rowman and Littlefield Publishers, Lanham

Biesta GJJ (2010) Good education in an age of measurement: Ethics, politics and democracy. Paradigm Publishers, Boulder

Biesta GJJ (2013) Receiving the gift of teaching: From 'learning from' to 'being taught by'. Stud Philos Educ 32:449–461

Boulay B, Luckin R (2015) Modelling human teaching tactics and strategies for tutorimh systems: 14 Years On. In: International Journal of Artificial Intelligence Education, earlyview, pp 1–12

Buber M (1923, 2004) I and thou. Continuum, London

Buber M (1925, 1961a) The Address on Education. In Between Man and Man. Collins, London

Buber M (1939, 1961b) The Education of Character. In: Between Man and Man. Collins, London

Carroll J, McKendree J (1987) Interface design issues for advice-giving expert systems. Commun ACM 30(1):14–31

Christensen R (1997) Effect of technology integration education on the attitudes of teachers and their students. PhD Thesis, University of North Texas

Flood M (1951) Report on a Seminar on Organizational Science, P-7857, The RAND Corporation, Santa Monica

Freire P (1996) Pedagogy or the oppressed. Penguin Books, London

Guilherme A (2014) Reflexions on Buber's 'living-centre': conceiving of the teacher as 'the builder' and teaching as a 'situational revelation'. Stud Philos Educ 34(3):245–262

Kritt D, Winegar L (2007) Education and technology: critical perspectives, possible futures. Lexington, Lanham

Kuhn T (1977) The Essential Tension. University of Chicago Press, Chicago, pp 240–265

Laura RS, Chapman A (2009) The technologisation of education: philosophical reflections on being too plugged. Int J Child Spiritual 14(3):289–298

Lepper MR, Woolverton M (2002) The wisdom of practice: lessons learned from the study of highly effective tutors. In: Aronson JM (ed) Improving academic achievement: impact of psychological factors on education. Academic, New York, pp 135–158

McCorduck P (1979) Machines who think: a personal inquiry into the history and prospect of artificial intelligence. Freeman, San Francisco

McCorduck P (1985) The universal machine: confessions of a technological optimist. McGraw-Hill, New York

McCorduck P (1988) Artificial Intelligence: An Aperçu. *Daedalus* 177(1):65–83

McDevitt TM, Ormrod JE, Cupit G, Chandler M, Aloa V (2013) Child development and education. Pearson, Frenchs Forest

Mirowski P (2003) McCorduck's *Machines Who Think* after twenty-five years—revisiting the origins of AI. In: AI Magazine, pp 135–138

Ohlsson S (1987) Some principles of intelligent tutoring. In: Lawler RW, Yazdani M (eds) Learning environments and tutoring systems. Alex, Norwood, pp 203–237

Olney AM, D'Mello S, Person N, Cade W, Hays P, Williams C, Graesser A (2012) Guru: a computer tutor that models expert human tutors intelligent tutoring systems. In: Proceedings of the 11th International Conference, ITS 2012, Chania, Crete, Greece, 14th–18th June. Springer, Dordrecht, pp 127–144

Postman N (1995) The end of education: Redefining the value of school. Knopf, New York

Ridgway J, (1988) Of course ICAI is impossible. Worse though, it might be seditious. In: Self J (ed) Aritificial Intelligence and Human Learning. Chapman and Hall Computing, London

Smith SR (2006) The relationship between student diversity, instructional differentiation and academic engagement in inclusive primary classrooms, PhD Thesis, University of Newcastle

Theunissen M (1984) The other: studies in the social ontology of Husserl, Heidegger, Sartre and Buber (C. Macann, trans.). MIT Press, Cambridge

Warschauer M, Knobel M, Stone L (2004) Technology and equity in schooling: deconstructing the digital divide. Educ Policy 18(4):562–588

Weinstein J (1975) Buber and humanistic education. Philosophical Library, New York