Automation in education: trending issues concerning Artificial Intelligence*

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Abstract

Discourses on technology have been marked by dichotomic, albeit predominantly optimistic, value judgments on the place of artifacts in educational contexts. In academia itself, digital artifacts are often advocated as solutions to educational problems that are, in fact, complex and historically rooted. This article tackles a question on the discourses that surround technologies based on Artificial Intelligence (AI): are old discourses – that hinge on the naturalization of technology – being reproduced? Based upon a review of academic literature on AI in education, conducted within the scope of a broader ongoing research project, the text presents an overview of key discussion points raised in the last five years in the field of Education. On the one hand, there seems to be great enthusiasm for AI and its promises; on the other, concerns are highlighted regarding teaching as a profession – in the extreme, worries with the replacement of the teacher by the machine, a fear that is also not new. However, our review suggests that, beyond unrestrained optimism or pessimism, discussion agendas address important points considered with basis on in-depth theorization and solid empirical data, which can open paths other than the development and acceptance of technologies in purely solutionist perspectives.

Keywords

Educational technology – Automation in education – Artificial Intelligence in education – Critical studies of education and technology.

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Introduction

The field of Education has long flirted with technologies that automate different aspects of teaching and learning under the guise of personalization, of teacher's release from non-classroom activities and their individualized attention to students. Although this discussion has gained momentum in the last decade with the increasing investment of technology companies, the use of automated devices for teaching –teaching machines – have been designed and tentatively fashioned for more than a hundred years. Since the 1920s, when the first teaching machine was invented by educational psychologist Sidney Pressey, 'ideas about programmed instruction have become "hard-coded" into all sorts of educational technologies and pedagogical practices' (Watters, 2021, p. 15).

Pressey's, and later Skinner's, teaching machines failed in the last century, and even today uncertainties remain that automated systems might one day be intelligent and comparable to a teacher in their craft. Even one of the first inventors of so-called Artificial Intelligence (AI), who created the *chatbot* known as ELIZA, did not believe that information processing systems could be equated with humans. However, as Crawford suggests (2021, p. 5), 'the belief that human intelligence can be formalized and reproduced by machines has been axiomatic since the mid-twentieth century".

Recently, the belief in the potential of automation to safeguard people from heavy or tedious work has been renewed in Education, a thriving field for the consumption of artifacts based on AI, which comprises a set of techniques currently seen as the most promising way to increase efficiencies. Such systems have been made available, implemented, and used more and more commonly by students, teachers and educational institutions in various parts of the world, raising many questions and leading to new research efforts. AI is a new element in the educational process that involves, in its use of Big Data, a series of ethical concerns, considering the role of data in the reproduction of inequalities through problems such as privacy, representation and a multitude of possible biases promoted by systems that use them (O'Neill, 2016).

Chassignol *et al.* (2018), in a study on the impact of AI in education, state that the field has been modified and remodelled by AI, which already supports development of content, teaching methods, student assessment and communication between educators and students. In addition, according to the authors, AI-based systems have opened up greater opportunities for the dissemination of Massive Open Online Courses (MOOCs) and make it possible to measure learning progress with a speed and effectiveness that is impossible for humans (Chassignol *et al.*, 2018).

Despite being increasingly widespread in several areas, finding consensus on the concept of AI is not an easy task. Wang, D. *et al.* (2015) define AI as an activity dedicated to making machines intelligent, construing intelligence as the quality that enables an entity to function, with a view of its environment. Ma *et al.* (2014) understand AI as a field within Computer Science focused on solving problems normally associated with human cognition, including learning, problem solving and pattern recognition, hence the development of machines capable of performing tasks involving visual perception, speech recognition, decision making and language translation, previously restricted to human

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intelligence. Crawford (2021), however, rejects merely technical definitions for AI, stating that it is neither intelligent, nor artificial:

> Rather, artificial intelligence is both embodied and material, made from natural resources, fuel, human labour, infrastructures, logistics, histories, and classifications. AI systems are not autonomous, rational, or able to discern anything without extensive, computationally intensive training with large datasets or predefined rules and rewards. In fact, artificial intelligence as we know it depends entirely on a much wider set of political and social structures. And due to the capital required to build AI at scale and the ways of seeing that it optimizes AI systems are ultimately designed to serve existing dominant interests. In this sense, artificial intelligence is a registry of power. (Crawford, 2021, p. 8).

In this sense, AI can be understood as a space of economic and political disputes, just as technology in general (Winner, 2017). Referring specifically to technologies in education, Selwyn (2014) argues that any educational technology is the product of conflicts between different agendas and promotes its own ideologies, especially values and specific conceptions of education itself. Discourses that surround technologies in education, including those in academia, have been predominantly optimistic, speculating that educational technologies, now digital, will solve old problems in education or, at least, serve to improve pedagogical practices, making them more efficient (Selwyn, 2011; Carvalho; Rosado; Ferreira, 2019). From this perspective, emerging technologies with AI could be added to a long list of artifacts proposed as a panacea for the ailments of an education that lacks innovation in various ways. Thus, it is questionable whether, in relation to AI, '[...] academics' possible complicity in the reproducing biases and inequality through the taken-for-grantedness of educational technologies' (Gallagher; Breines, 2023, p .58) has changed. Following this line of questioning, this article discusses whether, in the case of AI in educational contexts, the old discourses – based on the naturalization of technology – are being reproduced. The text explores the initial findings of a literature review conducted within the scope of an ongoing research project that addresses the discourses on AI in education from a critical perspective.

Methodological procedures

The literature review that supports our discussion has been conducted within the scope of a broader ongoing project, with the aim of analysing how the most recent publications in the area have addressed the presence of AI in education. The searches were conducted between August and September of 2022 using the following indexing bases: the Integrated Search of the Libraries and Documentation Division of PUC-Rio (DBD PUC-RIO), which is integrated with EBSCO and provides results indexed in the world's leading academic databases; *ERIC*, which collects articles exclusively from the area of Education; and *SCOPUS*, one of the largest databases of scientific articles in the world and a source of productivity indicators used in research evaluations in several countries. In addition, we also consulted the Brazilian Digital Library of Theses and Dissertations (BDTD). We prioritized works published in the last five years that were peer-reviewed and had the full

text available, restricting the search to works indexed in the area of Education. The results were filtered, yielding a corpus composed of 20 papers, 19 peer-reviewed articles and one dissertation, as shown in Chart1.

Chart 1- Search summary

Database	Descriptors	Filters	First survey		Final selection	
			Articles academics	Dissertations and theses	Articles academics	Dissertations and theses
ERIC	"Artificial Intelligence in Education"	Since 2017 / Peer reviewed only / Full text available on ERIC	20	-	10	-
SCOPUS	"Educational technology and EdTech"	2017-2022 / All open access / Article / Final	14	-	4	-
DBD PUC-RIO	"Inteligência artificial AND educação" (Artificial intelligence AND education)	Full text / 2017-2022 / Analysed by experts	40	-	5	-
BDTD	"Inteligência artificial AND educação AND tecnologia educacional" (Artificial intelligence AND education AND educational technology)	-	-	42	-	1
	Total		116		Total	20

Source: prepared by the authors.

Regarding the search carried out in BDTD, using a group of keywords related to the topic (shown in Chart 1), and without any filters, we obtained 42 results, but only one dissertation met the criteria set for the survey and was kept for review. Many of these works are from the late 1990s and early 2000s, when AI began to recover from the so-called *winter* that followed a wave of harsh criticism, especially from philosophers (Nilsson, 2010).

The selection was based on the abstracts, which showed several works only indirectly relevant to the question posed. As summarized in Chart 2 below, the corpus of selected articles contains only those that discuss empirical data and/or provide more or less in-depth reflections on teaching and learning, as well as considerations on how these technologies affect subjects involved in the processes and their relationships, including some case studies of the implementation and use of technologies in educational contexts.

Chart 2- Inclusion and exclusion criteria

	Exclusion criteria	Inclusion criteria
First survey	Technical texts on the development of AI and the functioning of machines; specialized texts from areas such as engineering, computing, medicine, among others, unrelated or little related to education in a broader perspective.	Works that address educational issues related to AI technologies.
Final selection	Works that focus on evaluating the behaviours or emotions of students or teachers in specific situations, also not directly related education or broader educational issues.	Texts with empirical data and/or theoretical texts that reflect on teaching and learning processes, as well as on how AI technologies affect the subjects involved in the processes and their relationships.

Source: prepared by the authors.

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The selected corpus was submitted to a thematic content analysis detailed in Bardin (1977) and summarized in Claudinei Campos (2004); the analysis involved the following phases:

- Pre-exploration of the corpus, when we skim-read the material with the aim of noting first impressions of the texts and their general ideas, not yet committing to systematization.

- Selection of units of analysis, when we identified the main themes that emerged from the reading, within the universe of AI in education. At this stage, we also chose to focus on the following dimensions of the selected texts: research objectives, theoretical framework, methodological procedures and findings.

- Classification of themes identified in the previous step. At this point, we organized the selected texts according to the themes identified in the previous readings and proceeded with the analysis of the meanings of the texts, using the research objective and question proposed for the work as a guide.

The following discussion presents a selection of findings from this analysis.

Findings: what does the literature show us?

The discussion below presents, initially, a general characterization of the literature included in the corpus of analysis, subsequently moving on to aspects more directly related to the topics under consideration.

General characterization of the corpus

In the selected sample, studies from Brazil and the United Kingdom predominate; other countries appear with less numerous outputs, and there are texts by researchers from different places of origin, as shown in Chart 3. Six texts produced by Brazilian researchers were also selected, including a master's dissertation.

Chart 3 - Origin of the studies

Country of origin	Number of works each
The United Kingdom	4
Brazil	6
More than one country	3
Germany, Saudi Arabia, China	2
Israel, Turkey	1

Source: prepared by the authors.

Qualitative studies prevail in the form of bibliographic and documentary research as well as literature reviews. There are also some case studies, whose data production instruments are questionnaires, interviews, and documentary surveys. The literature reviews found help us to have a prior overview of output on the topic.

Talan's (2021) bibliometric review reports that interest in AI studies in education has been increasing, with the United States leading the number of publications. The work of Hinojo-Lucena *et al.* (2019) explores the scientific production of AI in higher education indexed in the databases *Web of Science* and *Scopus* from 2007 to 2017, noting that, although AI is already a reality and there is worldwide interest in the topic, scientific production on its application in Higher Education (HE) is incipient, a conclusion consistent with Gatti's (2019). The systematic review by Vicari (2021) points out that, after decades of existing as an application in education, AI has finally been called upon to provide answers to some fundamental questions: whether the trend of educational technology will be the personalization of Education, assertiveness with users or to provide social interaction with educational results; what the disruption of Education will consist of; how educational systems will train people in a world in which AI and robotics replace jobs.

An important feature of the literature is the characterization of AI as a 'tool', also pointed out by Gatti (2019), a finding consistent with international literature reviews (Zawacki-Richter *et al.*, 2019; Zhai *et al.*, 2021; Flores *et al.*, 2022): most of the research produced can be traced to the areas of Computer Science or Engineering. Moreover, 'research focused on AI is based on the construction of teaching tools and seems removed from discussions on "what is it?", "What is it for?", "How is it made?", "What are the risks, the potentials?"' (Gatti, 2019, p. 85, authors' translation). In other words, the approach to AI is often instrumental and optimistic, with AI predominantly presented as a facilitator of the educational process.

In very general terms, the focus of the works is divided into the following aspects: studies on distance education based on or facilitated by AI technologies (Seren; Ozcan, 2021); research on the use of these technologies during Emergency Remote Teaching (ERT) adopted due to the Covid-19 pandemic (Nagro, 2021); case studies and analyses of the perception of the use of technologies by subjects who act in education (Parreira; Lehmann; Oliveira, 2021); the development of technologies for educational contexts (Luckin; Cukurova, 2019); and studies with a critical view on educational technologies (Gray, 2020; Davies; Eynon; Salveson, 2021), presenting various types of concerns that will be addressed later.

Regarding the contexts from which the research subjects were recruited, several are focused on HE (Williamson, 2019; Aldosari, 2020) and on issues related to teachers (Wang, S. *et al.*, 2020). In China's case, Yang (2019) justifies the emphasis of studies on HE due to the fact that this is the context where the implementation of AI is more advanced in the country, alongside civic education. Only one study included in the corpus exclusively addresses compulsory education (Gatti, 2019) and three deal with education as a whole, without focusing on a single level or sector (Yang, 2019; Renz; Hilbig, 2020; Santos; Freitas Jorge; Winkler, 2021). Articles of a more critical nature take the educational technology industry itself as their object, as discussed below.

The teacher at the centre of discussion

With ERT as a context, some of the works analysed reflect on the role of teachers in the use of educational technologies. Nagro (2021), for example, questions the role of

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e-learning and AI in improving behaviour and practices of HE teachers in unpredictable circumstances, in which face-to-face education is not possible. Through an empirical study based on the application of a questionnaire to 406 professors from Saudi universities, the author states that professionals consider that e-learning and AI have positively influenced their educational practices during the pandemic, with automation making challenging steps such as assessment more efficient. The author suggests opening new doors for online education, even after Covid-19, having a rather positive view of the application of AI in educational contexts.

The optimistic tone, however, finds a counterpoint in a legitimate concern: that, in addition to the emergency established by Covid-19, alternative systems to face-to-face education are being proposed even in contexts in which extensive digitization is still more publicity than fact. In this context, stakeholders may be induced to get used to technological developments and uncritically feel enthusiastic about their benefits, which suggests a prospect that education can be entrusted to computers without serious and in-depth discussion in all fields, especially in philosophy (Seren; Ozcan, 2021).

In fact, the literature shows that there is a lot of concern with the teacher: the question is how the teacher is positioned. There is a certain ambivalence in the views taken on the agency of educators in the implementation of AI in educational contexts. In some texts, teachers are presented as professionals whose opinion and practices must be influenced through specific training so that they accept and work efficiently with AI, for example, with a greater willingness to use intelligent tutor systems (Wang, S. *et al.*, 2020), beginning with the premise that teachers tend to be averse to these technologies due to a lack of knowledge or prejudice (Nazaretsky *et al.*, 2022).

Looking at the reality of distance education in Brazil, Santos, Freitas Jorge and Winkler (2021) claim that, concerning innovation in teaching and learning relationships through the incorporation of AI and virtualization in Virtual Learning Environments (VLE), students today are much more active and cognitively capable than previously, while teachers are in a phase of didactic adaptation. For these authors, the incorporation of these technologies implies new challenges and new paths, with the relationship between those involved in the processes becoming closer, more dynamic, and more interactive. Taken in juxtaposition, these works suggest that the same discourses we have been hearing for decades – about teachers being resistant or uninterested in educational technology – are now also being reproduced in arguments that defend the use of AI.

On the other hand, Parreira, Lehmann and Oliveira (2021) listen to teachers to better understand how they perceive possible modifications in the future of their professions motivated by what they call 'second generation technologies' (AI systems). Despite the difficulties in differentiating the impacts of distinct generations of technologies, the authors note that professionals recognize that they must change their professional skills profile. They conclude, therefore, that it is necessary to reinforce teacher training based on the 'competencies for the future' recommended by the Organization for Economic Cooperation and Development (OECD), these being mainly interpersonal and conceptual-strategic in nature (Parreira, Lehmann and Oliveira, 2021). In fact, recommendations contained in documents produced by multilateral organizations such as UNESCO and the

OECD, which maintain vast knowledge bases on the subject[3], are commonly mobilized to justify the urgency of adaptations for the use of AI in education.

In addition to training, a concern present in the corpus is with the replacement of the teacher by the machine. In our survey, this question appears in Luiz Fernando Campos and Luiz Antônio Lastória (2020), which reflects on the use of audiovisual technologies, digital platforms and AI software aimed at personalizing teaching. The text highlights, in addition to the possible replacement of teachers, concerns with the fragmentation of students' reading and writing habits and with the discourse on 'gamification' to make classes more attractive, stating that 'it is necessary for education to go beyond what is programmed, making visible what does not appear in computer interfaces: the economic, political and social contradictions hidden in the black boxes of devices' (Campos, L. F.; Lastória, 2020, p. 17).

Questioning the premises that support the assertion that it is possible to replace teachers with machines, Coelho (2018) reflects on the meaning of automation in education and teases readers: to consider it possible for automated machines to replace the work of teachers is, of course, to oversimplify the role of teachers and even students, reducing them to the part that works and ignoring all the potential of the imponderable, of that which is human and existing machines don't (yet?) provide. This is what Selwyn *et al.* (2023a) call '"reductiveness" of automation in education'. It also reveals the tendency to replace, partially or totally, the teacher with technology, a decades-old trend identified by Barreto (2017) in Brazilian policy texts. The trend appears with renewed force in documents of multilateral organizations related to AI (Ferreira; Lemgruber; Cabrera, 2023).

In this context, concerns grow not only for the future of the teaching profession, but also the forms that education itself can take from this subjectivation, which has consequences for the processes of socialization involved in human training, understood as a fundamentally communicative practice. The implications regard not only the already ancient concern with the consequences, for the world of work, of replacing humans with machines, but also, crucially, the types of subjects to be produced in contexts that support multiple forms of desocialization of the human through communication, at best, mediated by machines, if not, only with them (Selwyn *et al.*, 2023b).

Critical questions

Our review, although limited, seems to reflect differences amongst perspectives of AI that are observed in relation to other types of digital technologies. We identified, in the corpus, two main trends in the debate on AI in education: one that considers it a fact, given and markedly positive, in which it is up to those involved only to adapt in the best possible way to make the processes more efficient; and another that ponders the need to assess, in greater depth, its advantages, the difficulties it imposes on educational processes, and the subjects involved, as well as the political and commercial interests involved in the push for its rapid incorporation into educational daily life.

3- OECD and UNESCO maintain vast portals dedicated to AI: respectively, *OECD AI Policy Observatory* (https://oecd.ai/en/) and UNESCO AI: *Towards a humanistic approach* (https://en.unesco.org/artificial-intelligence)

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One of the most optimistic texts in our corpus, Aldosari (2020), states, from the answers obtained to a question asked to a sample of academics, that there is total satisfaction with what technology has achieved in education, as well as confidence in technological progress, pointing to a positive scenario in which AI can promote the improvement of academic education and student learning. The author also recommends, adopting a position similar to that presented in other works, that faculty ought to be prepared to use AI products effectively. According to studies that share this perspective, the incorporation of AI technologies in education is something inevitable, imminent, which will undoubtedly bring improvements by enabling the implementation of new teaching and learning practices, that is, a form of 'pedagogical innovation' by the mere use of digital artifacts (Aldosari, 2020).

However, important questions emerge more clearly when the relationship between AI and Big Data is made explicit, that is, when recognizing that talking about AI implies discussing issues related to data, including security and surveillance. Renz and Hilbig (2020) point out that, while the desire for flexibility and personalization – terms often used to qualify educational technologies with AI – drives the debate on AI systems based on machine learning, the lack of data sovereignty (which ideally should be subject to the laws of the country in which they are produced), uncertainty about the processes to which they are subjected, and the lack of understanding as to how AI systems, in fact, operate, are factors that prevent the development and implementation of appropriate solutions. In addition to these issues, it is important to remember, as Luckin and Curukova (2019) suggest, that most AI developers know little about teaching and learning, highlighting the importance of interdisciplinary research in the areas of AI and Learning Sciences, to enable better conditions to support design of effective algorithms for educational uses. Finally, it is necessary to consider that there are 'dark sides' in technology-facilitated education, as Zakharova and Jarke (2022) point out, especially attempts to 'fix' and fit multiplicities into one single thing, a dependence on automation in favour of improving the conditions of data production and processing, as well as a tendency to force individual adjustments instead of addressing structural inequalities. The data, in this case, would serve as a means to force different modes of standardization and obscure fundamental issues that must be faced in education.

Studies that adopt critical approaches are based on perspectives that politicize technology, that is, they oppose the belief in its neutrality, placing objects and actors in contexts marked by tensions and conflicts of interest. Thus, they recognize that it is not only what is done with artifacts that matters, but also (and perhaps crucially) how, where and to what ends they are produced, sold and introduced in specific contexts. In general, such texts tend to consider relationships that digital technology companies and education maintain. During the Covid-19 pandemic, many of these companies expanded their presence in educational contexts by offering their environments and services to education networks, often 'free of charge' (Vieira, 2022). Companies such as Microsoft and Google, amongst others, have been investing heavily in AI development, sustaining it as a trend that has been gaining more and more traction in education. Indeed, the history

of educational technology is long, but the financial and political advance of digital technology companies over education is recent, as Watters (2021) suggests:

> As the information technology sector has become more financially and politically powerful in the last decade or so, the voice of Silicon Valley has grown louder in the debates about the shape and direction of the education system. Many of its entrepreneurs have launched or invested in education businesses, often proudly ignorant of the history of education or the history of education technology. (Watters, 2021, p. 7).

In our corpus, two texts deal specifically with issues related to the expansion of large companies. Williamson, Pykett, and Nemorin (2018) analyse educational technologies based on neuroscientific insights on the function and structure of the brain proposed by Pearson and IBM. The authors describe ways in which the human brain is being understood, modelled, simulated and integrated into AI applications and 'cognitive systems' these companies are promoting, highlighting issues that need to be taken seriously, given that new forms of neuro-computational governance and biopolitics are being established, mostly in the wake of initiatives by large private companies. Williamson (2019) explores the articulation between governments and commercial actors in large-scale technological efforts to collect and analyse data from UK HE students. The study shows that the politicization and commercialization of data in HE is being translated into performance metrics in an increasingly market-oriented sector, which signals the need to strengthen political structures to ensure ethical and pedagogically valuable uses of student data.

In addition to these texts, which adopt richer theoretical frameworks and thus promote more in-depth discussions, Davies, Eynon and Salveson (2021) present findings from a sociological study that combines, according to a Knowledge Graph methodology, the concepts of 'field' by Bourdieu (2019) and 'technological solutionism' by Morozov (2013), with the purpose of investigating how and why discourses are being mobilized to defend that technology with AI can fix education. Davies, Eynon, and Salveson (2021) point out that AI disguised as personalization is a core concept within the field, being promoted as a way to correct education by, for example, making learning more efficient and effective. Contrary to the acceptance of the inevitability of technology as a solution to educational problems, Gray (2020) argues that educational uses of AI need to be a truly collective and non-commercial project. They should not be imposed on school communities without sufficient scrutiny and transparency. To this end, the author suggests that governments need to take the lead through a solid regulatory position, in which social inclusion is guaranteed.

Final remarks

This article presents findings from a literature review on AI in education. From a total of 116 texts in Portuguese and English published in the last five years, we selected 20 pieces to analyse, including 19 full peer-reviewed articles and a master's dissertation. In this corpus, we found a prevalence of works from the United Kingdom, most of them

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qualitative in nature. As for participants, higher education was presented as the sector of greatest interest among the studies. We highlighted the concerns related to teacher training and the development of knowledge and skills to work with technologies, or to the fact that these professionals are not being sufficiently considered in the development of AI for education. We also found evidence of fear regarding the possible consequences of these technologies for the teaching profession, not only in terms of increasing its already precarious status, but also in terms of a possible replacement of the teacher by the machine.

Although the scope of the analysed corpus is relatively limited, it gives us indications of how the issue of AI is being addressed in academia. It is significant that, out of an initial total of 116 surveys, only 20 showed, minimally, an engagement with broader questions about Education's present and its possible futures. We can assume that a substantial part of the excluded works considers AI inevitable, as is the case with some within out corpus. The inclusion of a single final graduate course work suggests a particularly worrying scenario regarding the acceptance of AI's inevitability in research training in Brazil. Thus, it is interesting to note the use of the *tool* metaphor as a way of conceiving AI in some of the works analysed. In fact, as Ferreira and Lemgruber (2018) suggest, this metaphor, perhaps the most widely used to talk about educational technology (Ferreira *et al.*, 2020), consistently supports the idea that education is broken, a metaphor also identified in our review. From this perspective, the answer to our initial question does not seem to be the most encouraging: many academics seem to be perpetuating a naturalized view of technology in discussions about AI, reproducing old discourses pointed to in our introduction.

However, our analysis suggests that, in addition to futurology and the predominantly optimistic perspective regarding the introduction of technological resources into educational contexts, important considerations of a more critical nature are on the agenda, which include concerns other than the development of technologies in purely solutionist perspectives. Although only a minority of works convey such questions (and, of these, most are international), in addition to the tendency to take AI as a given and markedly positive fact, leaving it up to those involved to adapt, we find crucial considerations on the need to assess in greater depth both its practical applications and the commercial interests that push for its rapid incorporation into educational contexts. There are concerns that technological developments are possibly misaligned with the needs of students and teachers, as well as considerations about the ethical use of data as well as blunt criticisms of the problems of surveillance, governance, and discourses in defence of technological solutionism in education.

Thus, it seems promising that the discussion about AI in education may yet overcome, more frequently, the dichotomic qualifications of technology as good or bad – often based simply on value judgments – that have been characterizing academic production around educational technology for some time. As defended by Selwyn (2017, p. 108), we need to be 'inherently sceptical, yet resisting the urge to descend into outright cynicism'. In this sense, it is necessary to deconstruct the usual naturalization of technology in a productive and thus potentially transformative way. This is the first step on a path that we glimpse for academia to not reproduce the solutionist discourses of industry.

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