Some Concerns about Automated Teaching in Times of the COVID 19 Pandemic: A Call for Prevention Schemes

Abstract
The article addresses the question of a possible technological change in teaching, triggered by the COVID 19 pandemic and the development of AI systems in education. On the one side, the pandemic lockdowns and remote education have stimulated reflections on different aspects of educational routine concerning rapid digital expansion into schools. On the other, sophisticated technologies are designated to intelligently support various types of learning. The article presents a brief overview of some ideas from the past, focusing on the automation of teaching. Then it shows how the pandemic situation will help to induce some changes. The socio-cultural perspective presented in the article provides interpretive frameworks for further research.

Key words: teaching, AI in education, COVID 19, technological change

Introduction

Each technological change is a never linear, but contingent and contextual process (Selwyn 2016). It means that the ways in which technology is implemented across society are not fully predictable. As a result, the development of automated teaching technologies will not be inevitable to be used in consistent ways with anticipated outcomes. Moreover, the integration of any technology into society is always stretched between necessity and choice. As such, it opens an area for a discussion concerning socio-cultural approaches. However, the contexts in which technology use is situated can be severely limited to individual behaviors, individual development and “best practice and what works.” The predominance of these concerns leads to a largely restricted view of technology use in relation to its effectiveness and difference making. In addition to its strong influence, it has a certain advantage over socio-cultural approaches
based on the uncertainty of the future prospects of technology use in such a profoundly social - and therefore human process as education, that is, instead of questions, it puts an emphasis on an optimistic desire to show how to make an immediate but far-reaching difference in education.

In the times of pandemic, remote education offers an opportunity for rapid digital expansion and a change from traditional methods of lecture into alternative ways of teaching concerning apps, software and educational platforms designated to carry out pedagogical tasks. The automation of digital teaching is set to be a particularly dynamic process under threat from the turmoil of another pandemic lockdowns. The pandemic time can help to legitimate any discourse of technological innovation and justify its claim for educational reforms. However, these are not straightforward technical issues. Therefore, the politics of digital automation is far beyond the focus on matters of design and efficiency. It engages the realms of values, judgements and beliefs.

**Teaching machines**

The belief that technology can facilitate teaching is deeply ingrained in the notion of automating instructions (Selwyn 2019). Although there is still a consensus among academics that human learning is a by far more complicated than the first behaviorists initially conceived, behaviorism has cast a long shadow on educational technology and teaching machines. It was B.F. Skinner who set the theoretical foundations in automated instruction. Skinner suggested a new way to explaining learning through the concepts of shaping and reinforcing behavior by instant feedback. In addition to his theoretical contribution to automating instructions, he designed a teaching machine in order to prove his ideas on education. The idea stood behind his invention was relied on the description of class education in which there was a set of stimuli and responses between the student and the teacher. In his own words, “teaching is a matter of arranging contingencies of reinforcement under which students learn” (Skinner 1969:25).

Skinner’s machine was a piece of equipment with moving parts that was designated to do a true/false question. The student received instant feedback for a respond and moved forward to the next task only if his answer was correct. In theory, the student would control the level of learning and advance when the content was mastered. Skinner explained that learning could be accomplished, provided that the student went step by step in the right direction through the content, and each step required a regular feedback. In his view, the turning point was that every student needed to attain the same level of mastery, but he set his own speed of learning. Students with less ability could take their time without being publicly embarrassed by their slower
progress, whereas students with skills could move forward quickly and they were not being held back and bored by a slow pace of learning.

For Skinner, that programming would take the role of teacher by offering questions/answers in the manner a teacher might do. However, as he stated: “the machine itself, of course, does not teach. It simply brings the student in contact with the person who composed the material it presents” (Skinner 1958:971). Skinner’s approach to programming was linear, based on the idea of going from one thing to another in a single series of stages. In spite of its simplicity, the critical point was that Skinner’s teaching machine introduced some key concepts in digital teaching and educational technology such as individual progress, adaptive behavior and instant feedback.

**Game-based learning**

Teaching machines were simply replaced by a more sophisticated machine – the personal computer. In that change, however, one premise was constant that technological breakthroughs would offer new insights into the process of teaching. The main idea of how to teach by using machines was taken over from Skinner’s behaviorism to Piaget’s constructivism. At the core of Piaget’s theory of constructivism is the assumption that education starts with an understanding that children have a set of evolving principles based on direct experience related to their previous experiences (Piaget 1964). As a result, one of basic rules is that children need to discover for themselves the errors of their ways and make connections relied on their own experience rather than learning by being told directly. All new knowledge is self-constructed. In constructivism, the teacher’s role is to define a problem that covers the content to be learned, provide an environment that will help solving the problem through exploration, and give support for the student’s exploration of that environment.

The computer program creates environment that is limited to some specific problem in which students will construct their own solutions. This idea is deeply in rooted in game-based learning, especially since digital games were an entrenched part of childhood (Zagal 2010). Piaget (1952) believed that children were distinct beings with age-related and fundamentally different views of their environment from adults. At the foundation of game-based learning approach lies a similar idea about how children view their world that they inhabit. The impact and potential of games is brought into an interest in using game dynamics to support learning.

The educational game environment is constructed around principles found in Skinner’s teaching machine such as individual progress, constant feedback and mastery learning based on
a step by step method. In addition to these attributes, it is flavored with Piaget’s views on child education, where specific objectives are defined and students must navigate through it on their own. Moreover, the modern educational game environment creates social groups out of their players. Group networking with its ability to get people connected has ignited a remarkable turn in digital teaching.

**E-learning**

E-learning has its roots in the correspondence schools (Ferster 2014:124). The use of Internet to deliver digital contents to students transforms traditional instruction in different contexts. The digital context is fully searchable, making easier for the student to go back and review previous sections any time as required. Moreover, the instructions are often customized into individual preferences and fit the learner’s goals. Furthermore, most of e-learning tools provide a didactic, instruction-driven experience aimed at producing the face-to-face classroom experience.

The flexibility of e-learning gives an opportunity for a wider participation, because it is not obligatory for students and the teacher to be in the same location. There is also a variety in its synchronicity. A synchronous course presents the class at a particular time and it provides a communication platform to interact with one another during the class. An asynchronous course allows students to browse for the instructional content at any time that is convenient, but because of the lack of a common time space, the modes of communication are limited to email, chat, or online forums.

One of the important limitations of e-learning is the teaching instruction and the cost of delivering it, because the teacher’s time is circumscribed. Each time the class is taught, the teacher must be present to teach it. Best solution for effective e-learning lies in combination of student driven with asynchronous learning, but also adds the assistance of the teacher (Ferster 2014:125). Therefore, the recent surge in investments in educational technology drives the development of digital teaching based on the AI that will eventually replace the necessity of the assistance of the teacher in person.

**The AI**

The AI work is associated with adding intelligent features to computerized technology. One crucial aspect of this work is based on the concept of machine learning. In the process of
machine learning algorithms are trained to incorporate large amounts of data in order to learn how to make decisions and perform tasks. The most recent add to machine learning is so-called deep learning. Deep learning introduces the application of machine learning to artificial neural networks. They are designated on the complex structure of biological brains. Thus, a deep learning system is able to train itself to refine the accuracy of algorithms until they are capable of reaching accurate conclusions. The capacity for autonomous learning based on neural networks will offer a key to building a machine with human-like intellect and skills.

Despite its development, the AI system is still heavily relied on the logics it programmed with and the data set it is trained on. The AI is strongly connected to the power of classification that disclose the forms which society will assume. Therefore, it has become an area of computer science associated with social consequences. Although this shortcoming is recognized, there is a hope that any short-term limitation will be overcome in the light of the potential for long-term transformations as the process of evolving proceeds (Fernster 2014).

One possible view on the educational implications of the AI is an intelligent tutoring system. It is interesting that some intelligent tutoring systems are equipped with digital assistants which allow learners to role-play with them in order to receive instructions. Digital assistants are designated to look and behave like real people and their work is extended from displaying information, testing and explaining to motivating and reassuring learners.

The intelligent system is designated to respond to a domain of what the learner should be doing during the task. In process, the learner’s actual performance is compared with an expert model and the system analyses where the learner’s actions are deviated. On the basis of comparisons, the system is able to provide a feedback in order to guide the learner step by step to solution. The most significant rule of the intelligent system is to help students learn by doing rather than through instruction. Such an engaging form of tutoring is by all means adapted to vocational education and training.

When considering teaching in terms of personal/intellectual transformative potentials, it is pedagogically crucial to distinguish education from training. Education is more general and aims at cultured and civic-minded citizenry, whereas training is reduced to specialization and the acquisition of a narrow range of skills and information connected with a specific task, challenge, or problem. Training is instrumentally geared to meeting definable goals and the intelligent system is truly dedicated to acquisition of technical knowledge and the details that are specific to a given field.

This truth about the design of contemporary tutoring systems is often veiled by claims regarding the AI associated with expert knowledge and one-and-one tutoring (Fernster 2014:
159-161). It is also limited to a technicality concerning a question of how to support artificially intelligent tutors capable of authentic communication. The recent developments are based on so-called empathy technologies which are sensitive to biometric techniques of mood detection such as eye-tracking or facial recognition. At the same time, the AI avatars are developed to display their own emotions in order to behave naturally and believably. In addition to emotional development, they will be able to provide differently nuanced mentoring approaches after finished with the scan of a type of the potential learner. Even now, some systems give an opportunity of multiple agents to work with a single learner. Nevertheless, it cannot be forgotten that each intelligent system, even the most complex system is essentially created around closed forms of repetitive training. Regardless of open-ended and socially rich learning claims, intelligent systems are most successfully found in dealing with rational and repetitive lines. They focus on triggering the correct outcomes in education.

The art of teaching

The significance of education in every society provokes a discussion on the art of teaching. The model of teaching which is found in the AI system is strongly based on some romanticized vision of teaching vaguely referring to the Socratic method where the teacher uses dialogic questioning of alternative viewpoints in order to lead the student to discover and get understandings. However, the practicalities of modern teaching are by far more complex, because they involve detailed planning, organization and management of work. Not to mention, other functions that teachers are responsible for, such as disciplinary and bureaucracy. On the contrary, one claim for the AI is that it will not be preoccupied by the production of evidence of teaching, but it will focus on teaching (Selwyn 2019: 3-4).

It leads to the core of a question of what “good” teaching is. In many cases, the preferable model of teaching concerning the AI is the ideal of individual instruction which is traditionally rooted in educationally oriented technological innovations. It resonates with some social changes in society towards the individualization of social life. Collective and institutionalized learning is often harshly criticized for being a poor substitute for individualized forms of learning. In the view, the idea that students should learn the same thing at the same time is seen so socially backward as an artifact from the way classroom have to be organized by age. Individual instruction under the guise of one-to-one tutoring is presented as the apex of classical teaching, which is the reference to the retro-utopian vision of the Athenian philosopher teaching, yet flavored with digital technology (Clark 2000).
Nonetheless, teaching is never a simple process of transferring knowledge and skills to students. Teaching involves supporting the development of a student’s intellect for sure, but most importantly it cultivates the development of heart and soul. At the core of teaching, the development of character is as important as the acquisition of knowledge. It means that some dimensions of teaching are beyond a formal logic of calculability, as a result of cultural and social contextualization. Any AI system, even the most sophisticated one, is completely dependent on the data. Any gaps and omissions are vitally important in terms of education. Even the best models of teaching contain grey areas. Moreover, there are many social and cultural factors integral to understanding what happens in education they may be not really measured and quantified. Some of them just need human compassion and wisdom.

**Pandemics as a possible game-changer**

With the outbreak of the coronavirus disease 2019 pandemic, as governments implemented virus mitigation strategies (lockdowns), many students are required to shift to remote education. Collectively, it abruptly reconfigured boundaries between education and technology. More precisely, widespread stay-at-home requirements restricted the elements of education to its remote forms based on some digital developments. These rapid transformations create an opportunity to develop knowledge about remote education on a large scale, its potentials for a change in education, as well as its repercussions. Some observations will provide the basic rationales for the widespread implementation of AI system in education.

**Economies of scale and corporate desires to reform education**

Support for AI-driven education comes together with a wider belief that schools and universities will benefit from technological innovation. The purpose of technology is to increase the efficiency of tasks that people perform. It encourages the corporate claims for reforms of “outdated and inefficient” educational systems (Clark 2020). The digital teaching is seen as a necessary reboot educational systems to scale education’s efficiency.

Issues of scale affect the delivery of instruction and its creation. It is true that AI systems and applications deal with massive amounts of data to make connections and detect patterns that would not be identified. They need a quality content of information to feed them and economies of scale to improve their performances. So far, online storage costs are low and there is a growing wealth of digital resources available, because its size is no longer an issue. The access to information is almost unlimited and the systems that can deliver content such scale are exist. However, it is claimed that some efforts in implementing the AI systems in education
are hampered from a lack of quality of information, or a determination to succeed in changing a mindset of contemporary educational agents (Bates et al. 2020).

However, the drifts of education towards the competency–enhancing potential of vocational type programs will give a hand in opening a back door for intelligent tutoring systems. Educational technology is particularly well-suited in offering a training mode, since training is a narrow, particular and instrumentally geared to meeting definable goals. Moreover, disciplines that train students to undertake tasks associated with the positivist concentration on precision and quantification as a superior approach to knowledge have already suited for a close cooperation with various AI applications (Popenici, Kerr 2017). Furthermore, popular views and understandings elevate hard or physical science to the top of an intellectual level far superior to humanities and social sciences. The application of new technology to teaching in hard science could be widely perceived as another natural step in proving its advancement and superiority.

Especially, in the times of pandemic, when traditional education systems suffer from lockdowns and uncertainty, educational technologies are praised for their efficiency. The pace of change in educational technology is rising exceptionally because of the Internet and digital devices users. It is entwined with a general shift in neoliberal societies toward the increased role of the private sector, increased individualism and a focus on data-driven efficiencies and accountabilities (Williamson, Eynon 2020). Increasingly, the public calls for relevance and efficiency in education, particularly in times of severe economic downturn. AI technologies will deal with the ways in which contemporary educational institutions are politically managed by the use of numeric measurement and accountability.

**Political desires to reform education**

In media, the public is repeatedly informed about a crisis in education. An essential part of a crisis in education narrative is a crisis of teaching with its burnt-out figures of teachers, those who want to leave the profession forever and the decline in numbers of potential recruiters. Moreover, there is a growing concern about the costs of education associated with educational labor and infrastructure. In difficult times, it might be expected that the public would call for rationalization and accountability of education, which usually reflect the views those who favor vocational-oriented education and the production of quantitative-tested knowledge. The public is not really attuned to what goes on education and therefore, people are understandably likely to be interested in practical outcomes of education and in curricula that promise cutting down on spending their tax money. In conclusion, alternative sources of
teaching might be introduced as an effective means of dealing with a lack of teachers, and at the same time, as an effective means of spending public money on more practical and results-oriented pursuits in education (Feenberg 2003:100).

Another political factor that might play a role in heading for AI applications in education is an intersection between education and ideology. Although teaching, after John Dewey, can be seen as cultivating the ‘habit’ of learning that is necessary for someone to thrive as a member of a democratic community, there are serious concerns in the public about the engagement of education in so-called cultural wars. The pandemic situation has been instrumentally used for politicians to achieve their particular goals and polarize the public opinion on social issues along different social and cultural lines (Jungkunz 2021). Education is an ideological battleground, because the politics of education are in fact conflictual, rather than harmonious, including their connections to economic and cultural systems, political ideologies and personal worldviews. On the contrary to this, many people want to believe that education can offer an apolitical haven, in otherwise a turmoil world of politics. In reference to their beliefs, alternative sources of teaching might be promoted as non-partisan and not polluted by personal value judgements tools in education (Selwyn et al. 2020). Such a position resonates well with governments, which are given a method of managing educational agenda in accordance with their political convictions. Moreover, even the AI driven systems based on certain algorithms are recognized as an effective means of controlling information, some people might support them anyway, because they see educational technology as a firewall in education that can stop the flow of ideological contents that are not approved by themselves.

Conclusion

The pandemic intersects with general concern over the impact of AI on education, work and social life. Massive changes caused by the pandemic have been created shifts in exposure of the role of technology in relation to the demise of traditionally defined education and work. It is widely expected that technology will enable new possibilities people have not predicted yet. In process, the importance of education-technology integration is seen as a digitally driven and progressive step towards a future turn in education.

It must be recognized, however, that there is an idea that lies at the core of the AI educational applications that the nature of teaching should be revolutionized by technological innovations. The pandemic could expose such claims for an urgent change in the education system, because of the use of dramatic language that proclaims a profound difference in the world and pronounces generational differences in relation to the remote forms of education and
work. In addition, the pandemic experiences evoke strongly bounded divides between the past of education and its future, also in terms of a normative change towards the creation of new norms concerning models of teaching.

In the meantime, however, according to contemporary experiences of teaching and digital technology during pandemic times, it is more likely than other scenario that teachers find themselves adjusting what they do in order to fit in the limitations of the digital machines they are working with. It clearly shows why teaching should remain an essentially human process.

References