

Employing Artificial Intelligence in Education: A Critical View through the Lens of Ethics

Anastasia – Sofia Alexiadou

Visiting Professor – University of Macedonia, Adjunct Lecturer (SEP) – Hellenic Open University

as.alexiadou@gmail.com

Abstract

Admittedly, advances in computer science and data technologies, especially the accelerating progress of Artificial Intelligence (AI), offer immense opportunities in almost every field of public sphere such as Education. AI is often adopted as a solution to many of Education's core problems, involving the scarcity of qualified teachers, student under-achievement and the growing education gap between students – learners coming from diverse societal backgrounds. In essence, employing AI in Education (AIED) entails four components: i. "Learning with AI", ii. "Using AI to learn about learning", iii. "Learning about AI" and iv. "Preparing for AI". Within this context, there is an exigent need for ethical boundaries to be placed that determine a principal ethical framework predominantly targeted to issues related to consent, data privacy, transparency, individual action, responsibility, trust and overall conduct in the deployment of AIED. It is claimed that this framework underlines the necessity to take into consideration key issues, such as the aims of applying AIED, where/how (from the single learner to whole classrooms, collaborative networks)/by whom (individuals, institutions or industry) AIED is employed. Given that, the ethics of AIED must address, inter alia, teacher expectations and roles; resource allocations (including teacher expertise); gender and ethnic biases and discrimination; conduct and discipline; what constitutes valuable and pragmatic knowledge; and appropriate pedagogical theories (such as instructionism and constructivism). Against this backdrop, this paper argues that the pathway to just, equitable, appropriate and human centered AI technologies in Education requires the critically successful employment of rules and regulations that lay the parameters and define the boundaries of operation and engagement. Establishing these rules and regulations is a presupposition for ensuring that AI technologies will be fit for the purpose of Education, namely its impact on pedagogy, the provision of quality and inclusive education, and children's developing behaviour and identity.

Keywords: Artificial Intelligence in Education, AIED, Ethics

Introduction

Admittedly, advances in computer science and data technologies, especially the accelerating progress of Artificial Intelligence (AI), offer immense opportunities in almost every field of public sphere such as Education. AI is often adopted as a solution to many of Education's core problems, involving the scarcity of qualified teachers, student under-achievement and the growing education gap between students – learners coming from diverse societal backgrounds.

1. The purpose of education

Some people argue that the purpose of Education is threefold, namely i. the provision of human capital for the economy, ii. knowledge transmission: ensuring that school students learn the content that has been mandated by policy makers, selected by curriculum developers, taught by teachers and assessed by exams, and which appears to be the aim of most AI tools that have been designed to support learners (Miao & Holmes, 2021); iii. human flourishing: a broader conceptualization of the aim of education (Reiss, 2021, p.8). In addition, this threefold purpose has two sub-purposes: a. to enable each learner to lead a life that is personally flourishing and b. to enable each learner to help others lead such lives too (Council of Europe, 2022: 27-28).

Respectively, it can be argued that a school's intention should be to prepare students for a life of autonomous and successful engagement in productive relationships, activities and experiences. This objective requires acquainting students with potential options from which to choose, although it should be conceded that students vary in the extent to which they are capable of making such choices. With students' development towards independent adulthood in mind, schools should provide their students with increasing opportunities to decide those that are suitable for them. Young children are inclined to need considerable guidance and counseling from their teachers, in the way that they receive from their parents. Part of the mission and role of schooling, as well as parenting, is to prepare children for the time when they will be compelled, and be able, to make decisions and choose more independently (Reiss, 2021, p.8).

The United Nations Convention on the Rights of the Child (UN CRC) eloquently states that "education should be directed to the development of the child's personality, talents and mental and physical abilities to their fullest potential" (article 29 § a). Additionally, the World Economic Forum (2015, p. 23) proposed that education should focus on the 21st century skills, namely i. foundational literacies (how learners apply core skills to everyday tasks): literacy, numeracy, scientific literacy, ICT literacy, financial literacy and cultural and civic literacy; ii. competencies (how learners approach complex challenges): critical thinking/ problem solving, creativity, communication and collaboration; iii. character qualities (how learners approach their changing environment): curiosity, initiative, persistence/grit, adaptability, leadership and social and cultural awareness.

Meanwhile, the Council of Europe's Reference Framework of Competences for Democratic Culture (2021, pp. 5-7) views education as fulfilling four major purposes: i. preparation for the labour market; ii. preparation for life as active citizens in democratic societies; iii. personal development; iv. the development and maintenance of a broad, advanced knowledge base.

The four purposes are complementary and equivalent. The Council of Europe recognizes education as a course of action enabling individuals to take independent decisions for their own lives, to recognize others as equals and to essentially interact with them. This perspective of education is linked to the ideals of democracy and human rights. Learning, involves procedures which engage the whole person: intellect, emotions and experiences. Experience-based and active learning complement learning based on theory for the competences that are needed for active democratic participation. Specifically, the Council of Europe provides an alternative model of the competences that need to be acquired by learners, from pre-school to higher education, so that they might participate adequately in culturally diverse democratic societies. The conceptual foundations of the Framework include 20 competences, grouped

into: i. values: valuing human dignity and human rights, cultural diversity, democracy, justice, fairness, equality and the rule of law; ii. attitudes: openness to cultural otherness and to other beliefs, world views and practices, respect, civic-mindedness, responsibility, self-efficacy, tolerance of ambiguity; iii. skills: autonomous learning skills, analytical and critical thinking skills, skills of listening and observing, empathy, flexibility and adaptability, linguistic, communicative and plurilingual skills, co-operation skills, conflict-resolution skills; iv. knowledge and critical understanding: knowledge and critical understanding of the self, of language and communication and of the world: politics, law, human rights, culture, cultures, religions, history, media, economies, environment, sustainability.

Furthermore, the 2020 United Nations Human Development Program Report reiterated that “education has more than an instrumental role – its purpose is transformative through exposure to broad human values and the promotion of critical thinking, to foster politically aware and active people” (p. 134). In a nutshell, a. until policy makers are explicit about the scope of education (for instance: is it to transfer knowledge, augment exam success, guide young people to evolve their individual potential and self-actualise, or to endorse mutual understanding, tolerance and friendship among all peoples?), and b. until they have adopted and implemented appropriate policies and tactics, what should be taught about AI “remains moot” (Holmes et al., 2022, p. 28).

In essence, employing AI in Education (AIED) entails four components: i. Learning with AI: involves the use of AI-driven tools in teaching and learning, and includes the use of AI to support learners directly (comprising of tools such as intelligent tutoring systems, dialogue-based tutoring systems, exploratory learning environments, automatic writing evaluation, learning network orchestrators, chatbots and AI to support learners with disabilities); the employment of AI to back up administrative systems (such as recruitment, timetabling and learning management); the implementation of AI to reinforce teachers. ii. Using AI to learn about learning: is not strictly AI, which indicates automation to a certain extent, but does concern the analysis of the same or similar data to that used by “learning with AI” tools, and applies similar analytical techniques. iii. Learning about AI: involves increasing the AI knowledge and skills of learners of all ages (that is, from primary education, through secondary, to tertiary) and their teachers, encompassing the techniques of AI (e.g. ML) and technologies of AI (e.g. natural language processing). iv. Preparing for AI: involves ensuring that all citizens are aware of the possible impacts of AI on their lives, as well as their working environment, in order to comprehend issues such as AI ethics, data biases, surveillance and the potential impact on jobs. In fact, preparing for AI should always be combined with learning about AI (Homes et al., 2022, p. 19).

Of note, during the COVID-19 pandemic, as the majority of educational processes moved online, so did many assessments – resulting in the company businesses of automated exam monitoring, e-proctoring, to grow immensely. But the application of e-proctoring is controversial and has been blamed for intrusion, racial discrimination, failing to work properly, preventing learners taking their exams and intensifying mental health problems, while having little impact on cheating or attainment. This forms a paradigm of automating and advancing unsuitable pedagogic practices, rather than employing AI to establish groundbreaking perspectives (Conijn et al., 2022, pp. 1521-1532; Holmes et al., 2022, p.34).

As a matter of fact, since John Dewey, a learner-centric approach to teaching and learning has been a recurring theme in education research and practice. This approach allows children acquiring substantial control over the learning processes, thereby enhancing

learner agency. However, a learner-centric approach must also justify the fact that children do not have the same capacity as adults. In the context of AI in education, this means that children do not have the same capacity as adults to acknowledge issues such as bias, exclusion, intolerance and fairness, to give genuinely informed consent, or to appreciate or challenge the impacts of AI-based recommendations and predictions on their lives (Holmes et al., p.36).

It is noteworthy that there is little evidence of the widespread adoption of learner-centric approaches in AI in education. In fact, when employing AIED tools, learners may have less tangible control over their learning, the data that their interactions with the system produce, or ownership of any outcome. Furthermore, the constantly changing boundaries of the education environment, which progressively involve digital devices that interact with and aim to influence children's behaviour, can also be difficult for children to assimilate. Furthermore, due to the perplexity of the implications of the use of AI tools, it is beyond what can be expected of parents. In any case, there is no explicit way that children, educators or parents can independently verify claims about how AI may define a child's cognitive, social or emotional development (Brown, 2020; Holmes et al., 2022, p. 36; Lupton & Williamson, 2017, pp. 780-794).

In addition, the Council of Europe's study "Two clicks forward and one click back: Report on Children with Disabilities in the Digital Environment" (Lundy et al., 2019, p.11) states that "...children with disabilities, irrespective of the nature of the impairment, are disproportionately disadvantaged in terms of their ability to access and enjoy the benefits of digital technology." However, AI approaches are increasingly being used as a mean i. to overcome barriers to learning in the education of students with learning difficulties (Drigas & Ioannidou, 2013, p. 385, 388); ii. to diagnose dyslexia "a difficulty with written language, particularly with reading and spelling" (Kohli & Prasad, 2010, p.1); iii. to diagnose attention deficit hyperactivity disorder (ADHD), "a disorder in which a person has a difficulty to learn effectively, caused by an unknown factor or factors" (Anuradha et al., 2010, p.1); iv. to diagnose autism spectrum disorder "a neurodevelopmental disorder characterized by persistent deficits in social communication and social interaction, in addition to restricted, repetitive patterns of behavior, interests, or activities" (Stevens et al., 2019, p.29); and v. to support the inclusion of children with neuro-diversity (Porayska-Pomsta et al., 2018, p. 31).

Assistive technologies, such as text to speech, speech to text, spell checkers and search engines, are just some examples of technologies initially designed and developed with the aim to assist people with disabilities. However, the adoption and application of these technological aspects was later expanded and they can be found now as generic features in all personal computers, handheld devices or wearable devices. Nowadays, these technologies reinforce the learning interactions of all students globally, enhancing possibilities opened for teaching and design of educational experiences (Popenici & Kerr, 2017, p. 5). However, this repurposing is not always successful. For instance, the ambient noise in classrooms often indicates that speech recognition does not function well. Unfortunately, to date there has been little work on algorithmic or data biases specific to education and learner disabilities (Holmes et al., 2022, pp.36-37).

2. Ethics, AI and Education

The Universal Declaration of Human Responsibilities, which complemented the Human Rights Declaration and was proposed by the Interaction Council suggests a set of human ethical standards. In particular, article 13 stresses that “No politicians, public servants, business leaders, scientists, writers or artists are exempt from general ethical standards, nor are physicians, lawyers and other professionals who have special duties to clients. Professional and other codes of ethics should reflect the priority of general standards such as those of truthfulness and fairness.” Obviously, the Interaction Council holds that globalization of the world economy is connected with globalization of the world’s issues. For the reason that global interdependence requires that we must live with each other in harmony and peacefully, therefore individuals need rules and constraints. As such, ethics are the minimum standards that make a diverse society plausible. Without ethics and self-constraint, the survival of the fittest would prevail. Evidently, the world requires a code of ethics to lean on (Alexiadou, 2022; UDHR, 1997).

Based on the aforementioned, there is an exigent need for ethical boundaries to be placed that determine a principal ethical framework predominantly targeted to issues related to consent, data privacy, transparency, individual action, responsibility, trust and overall conduct in the deployment of AIED. It is claimed that this framework underlines the necessity to take into consideration key issues, such as the aims of applying AIED, where/how (from the single learner to whole classrooms, collaborative networks) / by whom (individuals, institutions or industry) AIED is employed. Given that, the ethics of AIED must address, *inter alia*, teacher expectations and roles; resource allocations (including teacher expertise); gender and ethnic biases and discrimination; conduct and discipline; what constitutes valuable and pragmatic knowledge; and appropriate pedagogical theories, such as instructionism and constructivism.

In particular, Instructionism is the term applied to describe teacher-centered, teacher-controlled, outcome-driven, highly structured, and non-interactive instructional practices (Johnson, 2009, pp. 91-92). Therefore, instructionism has been mentioned as systematic teaching, explicit teaching, direct teaching, and active teaching (Schug et al., 2001, p.3), terms that emphasize teacher, as opposed to student, behavior. Because the content of instruction and the content of knowledge are considered to be isomorphic (Driscoll & Rowley, 1997, pp.311-334), teachers are conceived as transmitters of objective reality; students are regarded as passive receivers of knowledge – of information. Since learning outcomes are objective and standardized, instruction is focused on efficient movement of skills and knowledge from the teacher to the student, often in the form of practice and rote memorization. Instructionists concentrate on detailed lesson preparation, on teacher organization and management and on teacher communication and effectiveness (Adams & Engelmann, 1996, pp. 7-23).

Driscoll and Rowley (1997) outline instructionism in terms of i. identification of student prerequisite or entry-level skills; ii. adoption and employment of the most effective methods of knowledge transmission; and iii. development of evaluative strategies that identify issues of transmission that must be resolved for the instruction to be deemed adequate (p. 313). While there are many classroom applications of instructionism, a particularly notable example is direct instruction. Direct instruction implements a basic set of instructional principles. In particular, all skills and concepts are divided into subskills or small component skills that are taught in isolation. Advocates of direct instruction hold that

particular underlying skills constitute prerequisites to school learning. As Byrne (1996) pointed out, “it might be prudent to tell children directly about the alphabetic principle since it appears unwise to rely on their discovery of it themselves. The apparent relative success of programs that do that, support the wisdom of direct instruction” (p. 424). Specifically, direct instruction is interpreted as a systematic set of procedures for i. specifying students learning requirements; ii. enhancing the efficacy of the learning environment; and iii. observing student curricular progress, so that instruction can be upgraded and corresponding learning outcomes augmented (Johnson, 2009, p. 92). Binder (1996, p.179) maintained that “...educational programs will be more effective in the long run if they produce a more focused, but truly mastered, repertoire rather than a broad but fragile repertoire.” Consequently, direct instruction depicts instructionist perspectives, lessons are teacher-controlled, authoritative and concentrated on observable student achievement outcomes (Johnson, 2009, p. 92).

Contrary to direct instruction is Constructivism, a term used to outline student-centered, student-controlled, process-driven, loosely structured, and highly interactive instructional practices (Ernest, 1995, pp. 459-486; Johnson, 2009, p.92; Prawat, 1996, pp. 215-224). Furthermore, Constructivism determines learning as a process of active knowledge building and not as a passive knowledge absorption and rote memorization (Johnson, 2009, p.92; von Glasersfeld, 1995b, p.28). Rather than absorbing information and ideas presented by teachers, or internalizing skills through rote memorization, constructivism considers that students build or produce their own knowledge (Johnson, 2009, p.92; Phillips, 1995, pp. 5-12). Students incorporate new information into pre-existing mental structures and adjust individual interpretation taking into account new information and experience (Jonassen et al., 1995; Johnson, 2009, p.92). From the constructivist point of view, learning is not a stimulus-response phenomenon. It requires self-regulation and the building of conceptual structures through reflection and abstraction (Johnson, 2009, p.92; von Glasersfeld, 1995a, p.14).

Additionally, for constructivists, the emphasis is put on learning processes contrary to learning products. The process by which a student discovers a specific answer is more important than retrieval of objective solutions. On the other hand, student error is regarded as a medium for obtaining insight into how the student arranges his/her world of experiences. Therefore, multiplicity is central to constructivism, that is, there are multiple depictions of reality, none of which is undoubtedly superior or inferior to the others. Although various interpretations and applications exist, constructivist instruction and constructivist classrooms are identified by authenticity and a focus on students. Constructivist classrooms strive to create real-world environments in which learning is relevant. Instructional center of attention is on realistic and plausible perspectives to solving real- world problems. The teacher is conceived as a facilitator of student understanding in contrast to a transmitter of knowledge. The role of the teacher is not to dispense knowledge, but to provide students with opportunities and motivations to produce meaning (Honebein, 1996, pp.11-12; Johnson, 2009, p.92; Jonassen et al., 1995, pp.7-26; Martinez et al., 2001, pp. 965-977; Phillips, 1995, pp.5-12). After all, Mayer (1996, p. 152) described the teacher’s role as guide for exploring academic tasks, the student’s role as sense maker through discussion, guided discovery and supervised participation on academic tasks.

3. Concluding Remarks: Looking ahead

In conclusion, the pathway to just, equitable, appropriate and human centered AI technologies in Education requires the critically successful employment of rules and regulations that lay the parameters and define the boundaries of operation and engagement. Establishing these rules and regulations is a presupposition for ensuring that AI technologies will be fit for the purpose of Education, namely its impact on pedagogy, the provision of quality and inclusive education, and children's developing behaviour and identity.

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