AI IN EDUCATION

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In 2019, the Director General of UNESCO suggested in her Mobile Learning Week keynote that Artificial Intelligence (AI) is the biggest invention since the Paleolithic age.

AI refers to machine-based systems that can make predictions, recommendations, or decisions that influence real or virtual environments, given human-defined objectives. AI systems interact with us and act on our environment directly or indirectly. Often, they appear to operate autonomously and can adapt their behavior by learning about the context (UNICEF, 2021, p. 16).

Its use is increasingly becoming predominant, and investments in this field are growing exponentially. In education, what AI can do is usually misunderstood. Artificial Intelligence in Education and Learning (AIED) and its possibilities can be classified into three distinct and arguable categories: student-focused, teacher-focused, and institution-focused (Holmes et al., 2019).

Furthermore, it is essential to acknowledge the different approaches to the development of AI. It is important to note that in education, knowledge-driven AI is more used than data-driven AI [1]. Therefore, we will explore how AI is used in education to bolster the spread of knowledge and raise some ethical issues relating to teaching and pedagogy.

Firstly, there are according to Wayne Holmes and Ilkka Tuomi (2022), 11 subtypes of student-focused AIED uses. Here is a brief introduction to them. Intelligent tutoring systems (ITS) personalize teaching for students based on their prior knowledge and interests. AI-assisted apps, such as Photomath, provide answers to specific pieces of homework, especially in mathematics. Lastly, AI-assisted simulations (e.g., games-based learning, VR, AR) offer a new way of visualizing concepts, such as apps that create three-dimensional models of molecules in chemistry [2].

Secondly, there are, according to Wayne Holmes and Ilkka Tuomi (2022), 6 subtypes of teacher-focused AIED uses. Plagiarism detection apps and websites are very popular. One of the most widely used ones is Turnitin (Turnitin, 2022). Classroom monitoring offers a new kind of supervision. For instance, there are now some AI-assisted video applications that monitor where a student is looking. This information allows the AI to guess whether the student is paying attention to the teacher or the task (Lieu, 2018) [3]. Furthermore, classroom orchestration apps allow teachers to plan and manage classes. For example, the FACT system assigns mathematics exercises to students and informs the teacher on which students need the most help at the exact moment (VanLehn et al., 2019)[4].

Lastly, some Institution-focused AIEDs help institutions allocate their time, energy, and resources better using optimization strategies and apps. Mostly in the United States, universities use AI to manage admissions and decisions. This makes the process cost-effective and less prone to human biases such as gender and racial biases. For example, the University of Texas at Austin uses the AI GRADE to decide whether an applicant should be admitted. This is based on their test scores, academic achievements, and letters of recommendation from teachers. The claim is that such a system and its implementation would save at least 74 percent of the time on reviews (Waters and Miikkulainen, 2014[5]). However, by 2020, GRADE had been abandoned as it was not effectively escaping the bias.

However, all those assets come with limitations that are also future avenues of research. For instance, AI users may become strongly dependent on Intelligent tutoring systems (ITS), preventing them from performing without digital support. Moreover, AI tools remain dehumanized and therefore cannot convey the interpersonal bonding necessary for a strong pedagogy and andragogy. Ultimately, some strong ethical issues are raised by such technologies. Developing and fostering new platforms with educative purposes is very costly and many consumers may not be able to afford it. This could increase social inequalities and lead to a more unfair commercialized education. Data privacy may also be endangered because of constant classroom surveillance. This is even more important when personal data is saved in other countries where regulations are less strict or nonexistent and in the case of political and economic conflicts worldwide.

In conclusion, the benefits brought by AI tools and platforms in education, AIEDs, are certainly a source of hope and foster new ideas for future innovations. However, some limitations should be addressed through regulation campaigns and ethical practices. Quite interestingly enough, although AI seems to be a great technological breakthrough changing everlastingly societies, some researchers and experts in the field limit its potentially transformative impact: "Data-driven AI is hitting a developmental ceiling, and that progress towards human-level intelligence is likely only to be achieved with a new paradigm […] sometimes referred to as 'neuro-symbolic AI' [6].

[1] Wayne Holmes, Ilkka Tuomi, State of the art and practice in AI in education, in Special Issue: Futures of artificial intelligence in education, December 2022, Pages 542-570, Volume57, Issue4

[2] Behmke, Derek, et al. "Augmented reality chemistry: Transforming 2-D molecular representations into Interactive 3-D structures." Proceedings of the Interdisciplinary STEM Teaching and Learning Conference (2017-2019). Vol. 2. No. 1. 2018.

[3] Lieu, J. (2018). Eyes to the front camera: Chinese facial recognition tech targets inattentive students. Blogtext. Mashable

[4] VanLehn, K. (2011). The relative effectiveness of human tutoring, intelligent tutoring systems, and other tutoring systems. Educational Psychologist, 46(4), 197–221

[5] Waters, A., and Miikkulainen, R. (2014). GRADE: Machine learning support for graduate admissions. AI Magazine, 35(1), 64.

[6] Wayne Holmes and Ilkka Tuomi, 2022, Ibid