

Artificial Intelligence in Education: Personalization of Learning and Its Implications for Equity and Accessibility

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ABSTRACT

This article examines how artificial intelligence (AI) is integrated into education to personalize learning, focusing on implications for equity and accessibility. It analyzes current AI applications—such as intelligent tutoring systems, adaptive learning, and virtual assistants—that customize educational content to individual student needs. The article addresses challenges like the digital divide, algorithmic biases, and privacy concerns, which may exacerbate existing inequalities. Through real-world case studies, it highlights potential benefits and obstacles in implementing AI in education. Recommendations are proposed for equitable and accessible AI integration, including ethical policy development, promotion of inclusive pedagogical practices, investment in technological infrastructure, and designing human-centered technologies. Finally, it emphasizes balancing technological innovation with social responsibility, calling for collective action by policymakers, educators, and technology developers to shape an inclusive and effective educational future.

I. INTRODUCTION

The integration of artificial intelligence (AI) into education systems is one of the most structuring transformations in contemporary education. Presented as a major lever for pedagogical innovation, AI

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promises to go beyond standardized teaching models by offering personalized learning paths, capable of adapting to the needs, rhythms and cognitive profiles of learners. This promise is based on the idea that automating the analysis of learning data would optimize academic engagement and success at scale. Holmes et al. (2019) point out that AI could “revolutionize education by offering tailored learning experiences that are sensitive to each learner's strengths and weaknesses.”

Over the past decade, rapid advances in machine learning, big data analytics, and natural language processing have fostered the development of so-called “smart” education systems, capable of interpreting learning traces in real time and dynamically adapting educational content. More recently, the emergence of foundation models and generative AI systems, in particular Large Language Models (LLMs), has profoundly changed the landscape of educational AI, introducing new forms of interaction, automated feedback and co-construction of knowledge (Kasneji et al., 2023; Holmes et al., 2023). The COVID-19 pandemic has also accelerated the mass adoption of digital devices and highlighted the need for more flexible, adaptive and resilient teaching modalities in the face of systemic crises (UNESCO, 2021).

In this context, the personalization of learning is a central objective of digital education policies. It aims to recognise the uniqueness of each learner by adjusting not only the pace and content of teaching, but also the methods of support and assessment. Several empirical studies have shown that personalized devices, when properly designed and supervised, can improve motivation, engagement and academic performance, especially among learners with difficulties (Pane et al., 2017). AI plays a key role in these dynamics by analyzing student interactions with learning environments and generating supposedly individualized pedagogical recommendations.

However, this technological dynamic is accompanied by major concerns in terms of equity and accessibility, which go far beyond the sole issue of access to digital tools. As Selwyn (2019) and Benjamin (2019) point out, educational AI must be understood as a socio-technical system, embedded in pre-existing power relations, economic logics and social structures. The digital divide, understood not only as a lack of equipment but also as an inequality of skills, uses and conditions of appropriation, remains a major obstacle to truly inclusive personalization (Van Dijk, 2020). In addition, algorithmic biases resulting from non-representative or historically unequal training data can lead to forms of indirect discrimination, reinforcing gaps in performance and orientation between social groups (Noble, 2018; Eubanks, 2018).

Therefore, the personalisation of learning by AI cannot be considered inherently fair. It poses a fundamental tension between, on the one hand, the ability of smart technologies to individualize educational pathways and, on the other hand, the risk of automation and legitimization of existing inequalities. This tension invites us to go beyond a strictly technocentric approach to question the pedagogical, ethical, political and social conditions in which AI is designed, deployed and regulated in education.

It is in this critical perspective that this chapter is situated. It aims to thoroughly analyze the uses of AI in the personalization of learning and to examine their implications for equity and accessibility. More specifically, the objectives pursued are as follows:

- examine the current applications of AI in the personalization of learning, highlighting the technologies used and the underlying pedagogical models;
- analyse the potential effects of these schemes on equity and accessibility, distinguishing between opportunities to reduce inequalities and the risks of their amplification;
- Propose recommendations based on critical ethical and pedagogical frameworks, to foster a responsible, inclusive and socially just implementation of AI in education.

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