# General Artificial Intelligence in Education

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Artificial intelligence (AI) is a computer-based system designed to achieve human-defined goals by making predictions, recommendations, or decisions that impact real or virtual environments. AI systems interact with humans and influence their environment, often operating autonomously and changing their results based on non-programmed machine learning. AI in Education (AIED) is the integration of AI technologies in learning environments to enhance teaching, learning, and educational administration. Although AI applications have existed in education since the 1990s, they have seen a rapid increase in use since the early 2020s with the release of large language models and generative AI. This boom in AI has brought both opportunities and risks.

There are several domains of AI, with AIED receiving a great deal of attention (Holmes et al., 2019; OECD, 2022; Pedró et al., 2019). For example, AI has produced teaching and learning solutions such as adaptive learning platforms, intelligent tutoring systems, virtual teaching assistants, and automated grading (Gillani et al., 2023; Holmes et al., 2019; KPU, n.d.; Zawacki-Richter et al., 2019). Thus, AI is being used in complementary ways to support learning and to help understand learning.

There are many potential benefits to AIED, such as providing multiple means of engagement, representation, and expression (Delisio & Bukaty, 2019), increasing accessibility to learning (Mao et al., 2024; UNESCO, 2023) and improving learning outcomes through personalized instruction and immediate feedback (Gillani et al., 2023; Mavroudi et al., 2018; Muñoz et al., 2022; UNESCO, 2023; Velusamy, n.d.; Zawacki-Richter et al., 2019).

In pedagogy, AI supports theories like constructivism and self-directed learning by enabling personalized learning experiences and providing scaffolding. Holmes et al. (2019) suggest flipping the classroom, where AI can facilitate the acquisition of foundational knowledge outside of class, allowing in-class time to be used for more interactive, higher-order learning activities.

In contrast to the benefits and opportunities, there are significant limitations, such as concerns about teacher roles, unrepresentative data sets resulting in biased and poor user experience, and equitable access to AI resources (Ferrara, 2024; Saputra et al., 2023). AI also requires substantial amounts of energy (Leffer, 2023) and data to generate content, including personal information that could be used to identify individuals (Pedró et al., 2019).

Challenges associated with AIED include ethical considerations, data privacy concerns, intellectual property issues, and teacher-student relationship dynamics with AI in the classroom. As a result, educators must be aware of the strengths and weaknesses of AI in learning (Eaton et al., 2022; Holmes et al., 2022). For instance, AI algorithms often utilize data that contains inherent human biases. These biases can be exacerbated as the algorithms continue to propagate them (Douglas, 2017). As a result, AI can be biased towards certain groups, world views or types of content, which can perpetuate existing inequalities and discrimination (KPU, n.d.; Santos & Radanliev, 2024). Additionally, issues of Indigenous data sovereignty arise, where AI systems can perpetuate settler colonial patterns of exploitation and extraction, and reinforce stereotypes (Gaertner, 2024).

Another challenge is to ensure inclusion and equity for AIED where countries in the global south experience a greater divide in technological, economic, and social development (Pedró et al., 2019; Santos & Radanliev, 2024; UNESCO, 2023). Furthermore, AIED introduces numerous ethical concerns related to access to educational systems, personalized student recommendations, the concentration of personal data, and data privacy (UNESCO, 2023). Therefore, regulating AIED requires public discourse on ethics, accountability, transparency and security.

Furthermore, AI companies collect massive amounts of student data and personal information to use machine learning to search for patterns. The goal is to improve student learning; however, the approach is controversial. There are questions around who owns and can access the data, whether students are aware of their data being used, and who is responsible if something goes wrong (Holmes et al., 2019; KPU, n.d.; Santos & Radanliev, 2024).

The extent of AIED’s potential impact on students, teachers and society in general has yet to be determined; however educational policies, guidelines and regulations have been developed and continue to evolve to address specific challenges and issues (OECD, 2022; Pedró et al., 2019). AIED is increasingly being used in teaching and learning, thus training on its use and implications is critical to ensure AIED tools and services are being used to optimize pedagogical opportunities in an ethical way. AIED is not only about teaching and learning with AI, but also teaching and learning about AI and its various domains (Chan, 2023; Holmes et al., 2022). Digital competency and literacy are required for both teachers and students to use this tool appropriately (Province of British Columbia, n.d.; Pedró et al., 2019; UNESCO, 2023). For example, teachers need to learn how to use AI in a pedagogical and meaningful way (UNESCO, 2023; Zawacki-Richter et al., 2019). Additionally, students should not only become competent and responsible users of AI (Chan, 2023) but also active co-creators of knowledge with this technology (Eaton, 2023).

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## Community Artifacts

2024 AI+Education Summit: AI-Future of Learning and Human Flourishing

2024 AI+Education Summit: Cutting Edge Work

2024 AI+Education Summit: What do Educators Need from AI?

Calvo, A. J., Ramazanov, F., Linton, S., Waddington, L., & Lalonde, C. (2024, March 4). The Creative and Ethical Use of Artificial Intelligence in Post-Secondary Education—A B.C. Perspective (2024-01-16). FLO Panel, BCcampus. <https://bccampus.ca/event/flo-panel-the-creative-and-ethical-use-of-artificial-intelligence-in-post-secondary-education-a-b-c-perspective/>

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