

Artificial Intelligence in Schools

Clemens Mader, Lorenz Hilty

For education and learning, there is a consensus that the impact of AI has its benefit-risk duality. To reinvent education systems towards an AI era, policy makers will need to examine potential benefits and risks of AI.



There are two main fields of applying AI in education, as described below.¹ Real-world examples are provided on the last page.

AI to promote personalisation and efficiency of teaching/learning

Personalization of learning

AI can help personalise learning through various ways. AI can help create a better professional environment for teachers to work more on students with difficulties. Teachers spend plenty of time on routine and administrative tasks such as making assignments and answering frequently asked questions over and over again in school settings. A dual-teacher model entailing a teacher and a virtual teaching assistant, which can take over the teacher's routine task, frees up teachers' time, enabling them to focus on student guidance and one-

¹ UNESCO, 2019. Artificial Intelligence in Education: Challenges and Opportunities for Sustainable Development, UNESCO Working Papers on Education Policy 07.

to-one communication. Teachers have already started “working together” with AI assistants for the best outcomes for their learners.

The Computer Assisted Learning (CAL) field creates alternatives to support students learning strategies with digital and in particular AI technology². AI can help map each student’s individual learning plans and trajectories, their strengths and weaknesses, and learning preferences and activities. Using algorithms to help students navigate through different content paths, AI can personalise learning and improve opportunities for students with the help of their teachers and schools. Intelligent Tutoring Systems (ITS) are part of the new technological possibilities to expand educational learning in developing countries as shown in recent reviews³.

Collaborative learning

In respect to computer-supported collaborative learning, online asynchronous discussion groups play a central role. Based on AI techniques such as machine learning and shallow text processing, AI systems are used to monitor asynchronous discussion groups, thus affording teachers with information about learners’ discussions and support for guiding learners’ engagement and learning.

Assessment tools

Considering the tremendous amount of time spent on grading tests and homework, AI as an assessment tool can be applied to learn how a teacher grades and thus free up the teacher’s time. AI is not only being used to grade multiple choice tests, but also for other types of performance assessment.

Language learning and translation systems

Language learning systems, such as the Duolingo app, use intelligent tutoring systems combined with a speech recognition AI system to meet the individual needs of learners as they learn the language. Pronunciation, vocabulary and grammar are practiced as needed. Dialogues can be conducted between the app and the learners in the language to be learned.

Furthermore, AI supported translation programs such as DeepL or Google Translate can be used for language learning in schools. These can translate words, sentences and entire documents, and even pay attention to grammatical or linguistic expression. Learners can be given suggestions for translation. Such programs are also used to lower language barriers for learning materials from different language regions of the world.

² Schitteck Janda, M., Mattheos, N., C. Lyon, H & Attstr.m, R. (2001). Computer assisted learning. A Review. European journal of dental education: official journal of the Association for Dental Education in Europe. DOI: 5. 93-100. 10.1034/j.1600-0579.200

³ Nye, B.D. (2015). Intelligent Tutoring Systems by and for the Developing World: a review of trends and approaches for Educational Technology in a Global Context. International Journal of Artificial Intelligence in Education, Volume 25, Issue 2, pp. 177-203.

Data analytics in Education Management Information Systems (EMIS)⁴

The term “**Education Management Information Systems (EMIS)**” refers to a class of information systems that collect, store, process, analyse and disseminate data for educational planning and management. EMIS are widely used for education leaders and managers at the regional, local and school levels and to generate national statistics.

With massive data collected from EMIS, AI algorithms are used to make data-driven decisions with the intention to improve school education.

EMIS let members across all levels of the education community access useful information for managing and administering an education system more efficiently, developing feasible and cost-effective plans, formulating responsive policies, and monitoring and evaluating educational outcomes. In countries where data are complete, reliable, regularly collected, and can be aggregated and disaggregated, AI-enhanced EMIS would have a much stronger capacity to automatically analyse the data and generate data dashboards at both the school and national levels.

Moving forward, EMIS open up a potential for developing predictive decision-making algorithms. While this remains a very nascent area in EMIS development, more countries, both developed and developing, are interested in transforming their current EMIS from a school-based aggregated administrative data management system into an integrated and dynamic **Learning Management Systems (LMS)** that can effectively support real-time decision-making in every aspect of education sector management.

On the following page, you will find short descriptions of real-world examples.

⁴ UNESCO, 2019. Artificial Intelligence in Education: Challenges and Opportunities for Sustainable Development, UNESCO Working Papers on Education Policy 07.

Examples

Example 1: Century Tech⁵ – AI-supported personalized learning software and learning management system

CenturyTech, a start-up from UK, offers AI-supported learning software for schools which specifically support the teachers in their work.

Their system supports the teachers in the assessment, in the composition of learning groups and is individually targeting learners for personalized teaching.

The AI system adapts the learning content (degree of difficulty, tempo, type of mediation such as visual or audio, ...) for the learners individually and provides the teachers with analyses of the learning behaviour of the pupils. Through the support of AI- software according to Century Tech, teachers should save work of up to 6 hours per week (design of teaching, administration). This leaves more time for individual support. of learners.

Example 2: Assessment of essays in China

In 2016, China's Ministry of Education established that every educational branch of local governments must allocate at least 8% of its budget to introduce digital technologies in education. With 95% of schools connected to the internet, the country is ready for the largest digital education experiment in the world. One of the biggest breakthroughs so far is the experimental design to **correct essays with AI**. The country started to work with 60,000 schools for automatic essay correction with a level of precision matching human correctors in 92% of the cases. The essay grading machine is based on neural network AI and is improving its ability to understand human language by using deep learning algorithms.

"It has evolved continuously and become so complex, we no longer know for sure what it was thinking and how it made a judgment," said one of the project researchers⁶.

Example 3: United Arab Emirates (UAE): Education Management Information System^{7,8}:

In the United Arab Emirates (UAE), the Ministry of Education rolled out an advanced data analytics platform with over 1,200 schools and over 70 higher education institutions, totalling over 1.2 million students. This data analytics system contains data on curricula, teachers' professional development, learning resources, financing, operations, performance reports, teacher, student and parent feedback, and scores from international assessments like PISA and TIMSS (Leading Countries of the World, 2018), UAE has a data analytics section in its Ministry of Education, dedicated to developing machine learning algorithms in support of strategic studies on the country's education system.

⁵ Centruy Tech (<https://www.century.tech/implementation/>)

⁶ Chen, S. (2018). China's schools are quietly using AI to mark students' essays... but do the robots make the grade? Society, South China Morning Post. Available at: <https://www.scmp.com/news/china/society/article/2147833/chinasschools-are-quietly-using-ai-mark-studentsessays-do>

⁷ Leading Countries of the World (n/d). Lessons from Using Advanced Learning Analysis in the Education Sector, p. 10. Available at: https://www.leadingcountries.com/wpcontent/uploads/2018/08/19498_MSEdu_LearningAnalytics12ppBrochure_V2.pdf

⁸ UNESCO, 2019. Artificial Intelligence in Education: Challenges and Opportunities for Sustainable Development, UNESCO Working Papers on Education Policy 07.