


Chapter 11

Transforming Education With AI-Driven Intelligent Tutoring Systems


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ABSTRACT

Artificial Intelligence (AI) has greatly enhanced the progress of Intelligent Tutoring Systems (ITS), revolutionizing conventional educational approaches with tailored learning encounters. Intelligent Tutoring Systems (ITS) are able to replicate personalized tutoring experiences, providing assistance that emulates human interaction and adapts to different learning styles and speeds. Although AI-based Intelligent Transportation Systems (ITS) have great potential, their implementation faces several hurdles. To tackle these difficulties, it is necessary to establish strong ethical principles, employ sophisticated data encryption techniques, and continuously improve AI models to guarantee fairness and inclusion. This study examines the potential and benefits of AI-driven Intelligent Tutoring Systems (ITS), emphasizing its ability to personalize education, enhance learning outcomes, and ensure equal access to high-quality education. The topic encompasses present applications, advantages, and obstacles, as well as forthcoming avenues for research and advancement in this domain.

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INTRODUCTION

Overview of AI in Education

Artificial intelligence in education (AIEd), created in the 1970s, aims to enhance teaching and learning using computer software research, development, and evaluation. AIEd is associated with obtaining feedback from learners, assessing strengths and limitations, and customizing instruction for a learner or group of learners. Researchers also anticipate employing AI in learning and teaching theories. Education focuses on developing learning capacity and human intellect, whereas AI centers on machine learning and intelligence like humans. AIEd expertise bridges this gap by offering strategies to promote more intelligent and effective human-human interactions that improve learning outcomes. Research and use of existing AI-based technologies have enhanced the teaching and learning process. The world we live in is changing due to artificial intelligence (AI). The phrase is challenging to define because of its interdisciplinary character and dynamic possibilities, even for specialists. This paper defines AI as a computer system that accomplishes specific tasks using talents and intelligent behavior previously considered exclusive to humans. Artificial intelligence (AI) refers to intelligent systems that automate tasks historically performed by humans. AI continues the digital age, with growing digital transformation altering how we live globally. Due to these changes, people's knowledge and abilities must adapt to the new reality. In this regard, the World Economic Forum identified sixteen skills—known as 21st-century skills—that the future workforce will require. This covers leadership, communication, digital literacy, curiosity, flexibility, etc. Although these abilities have always been critical for a successful career, learners now need them more than ever due to the digital revolution of the last two years and the emphasis on lifelong learning in most professional occupations. AI will significantly impact how we teach and acquire these new abilities. “AIEd” can significantly automate the process, track the learner's development in each of these abilities, and determine the areas where a human teacher's help is most needed. Based on students' learning backgrounds and settings, AIEd may be able to assist teachers in determining the best teaching strategies. It can create assessments, automate grading and feedback, and automate tedious operational activities.

Through recommendations, AI affects not just what students learn but also how they learn, identifying learning gaps, determining the most successful pedagogies, and determining how to hold students' attention. Teachers are the “human in the loop” in these situations. AI's only function is to help teachers make better decisions by giving them performance projections for their pupils or, with their consent, suggesting pertinent content to students. Teachers make the final decisions in this case. The mandate of UNESCO mandates an approach to AI that is human-centered by nature (Alam, 2023) There are four primary subdomains into which most of AIEd's work falls. We provide case studies of some of the most recent research in each field: Reducing teacher workload: AI in education aims to lessen teacher workload without compromising learning results. Students' contextualized learning: Since each learner has different learning requirements, the goal of AI in education is to give students individualized and/or tailored learning experiences according to their learning backgrounds and settings.

Revolutionizing assessments: AI in education aims to improve our comprehension of students. This encompasses their knowledge, learning style, and suitable pedagogies.

Systems for intelligent tutoring (ITS): AI in education aims to create intelligent learning environments that can communicate with students, offer personalized feedback, and improve their comprehension of particular subjects.

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