

AI FOR EDUCATIONAL ACCESSIBILITY

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Abstract:

This paper examines the role of artificial intelligence (AI) in advancing education, with a particular focus on its potential to address educational disparities in remote and underserved regions. It explores how AI-driven technologies, such as adaptive learning systems, natural language processing, and data analytics, can create scalable and accessible learning solutions that foster educational equity. The study highlights the integration of AI tools with practical applications like mobile learning platforms, cloud infrastructure, open educational resources, and collaborative learning environments to extend educational opportunities and mitigate global inequalities. Through case studies and data analysis, the research demonstrates that AI technologies significantly enhance learning efficiency and student engagement in remote areas. The findings underscore AI's potential to revolutionize global education by offering personalized learning experiences and facilitating the widespread distribution of educational resources. The paper concludes by offering recommendations for future developments in educational technology, contributing valuable insights and practical solutions for bridging gaps in educational access and quality. This work is an important contribution to the field of educational technology, offering innovative approaches to tackling educational disparities worldwide.

Keywords: Artificial intelligence (AI), education, educational disparities, remote regions, underserved areas, adaptive learning systems, natural language processing, data analytics, scalable learning solutions, educational equity, mobile learning platforms, cloud infrastructure, open educational resources, student engagement, educational technology

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Introduction:

Education has always played a significant role in a society's development. Over time, it has also experienced a number of significant alterations. Artificial intelligence (AI) and adaptive learning technologies are transforming education and its role in education for sustainability (EfS) like never before as we enter the new post-COVID era, which marks the transformation of the coronavirus pandemic (2020–2023) into the endemic (Adiguzel et al., 2023; de Vries, 2022; Jing et al., 2023).

In addition to providing individualized learning experiences, AI deployment aids in removing linguistic and geographic obstacles, greatly enhancing the efficacy and accessibility of education.

Educational systems that use AI and data analytics to customize the learning process are referred to as adaptive learning technologies. Based on each student's performance, learning style, and preferences, these technologies dynamically modify how instructional content is presented (Gligorea et al., 2023; Khan et al., 2022).

a) Adaptive learning System- The adaptive learning system is a method that uses data-driven training to modify and customize learning experiences to fit the unique needs of every student. In order to deliver individualized learning experiences, adaptive learning systems can monitor data including student performance, engagement, and progress. Equal education opportunity gives everyone the

same access to resources, but equitable education acknowledges and accommodates the disparities among students by giving them the right resources to succeed in their academic pursuits. Together with adaptable teaching and evaluation, adaptive learning aims to give all students equal access to education.

- b) Natural language processing-** Natural Language Processing (NLP) is a successful strategy for enhancing learning environments. It is predicated on practical methods for offering answers to a range of instructional challenges. In many diverse domains related to the social and cultural environment of language learning, natural language processing offers solutions. Teachers, students, authors, and educators can all benefit from this method of helping with writing, analysis, and evaluation processes.

In education, natural language processing (NLP) is used to evaluate and comprehend student writing, provide automated feedback on grammar, clarity, and comprehension, enable personalized learning experiences, translate educational materials into other languages, and help with content creation and curation.

- c) Data analytics-** Data analytics is used in education to enhance student outcomes and instructional strategies. Schools can use it to pinpoint pupils who are at risk, tailor instruction, and make the most of their resources.

The use of data in education to comprehend and enhance learning procedures, methods, and results is known as data analytics. A variety of data types may be involved, including student demographics, attendance, grades, test results, feedback, behavior, and online activities. Additionally, it may incorporate many levels of analysis, including prescriptive, diagnostic, descriptive, and predictive. In education, data analytics can assist researchers,

administrators, educators, and policymakers in finding answers, resolving issues, and coming to well-informed conclusions.

Methodology: Cloud Infrastructure

Cloud computing in education offers various benefits including increased accessibility, improved collaboration, cost saving and scalability. Cloud computing has significantly enhanced the teaching capabilities of educational institutions through the provision of scalable resources and tools. Cloud services allow schools and teachers to access storage, computing, and advanced analytics services without significant upfront investments (Ibrahim, U., 2024).

Applications:

With the help of cloud infrastructure, teachers can set up a variety of virtual classrooms where students can participate in class from any location with internet connectivity. Furthermore, cloud systems provide collaborative features like resource sharing and real-time document editing, which make it easier for peers, teachers, and students to communicate. For instance, Google Classroom is a cloud-based platform that supports online learning and lets teachers give homework and students turn in assignments (Leong et al., 2024). With the help of Access Cloud systems, educators and learners can access learning materials including online courses, video lectures, and digital textbooks whenever and whenever they choose.

These resources are accessible from any device with an internet connection and are kept on cloud servers. Geographically isolated areas without educational infrastructure can especially benefit from this cloud service capability. Online discussion forums, video conferencing, and real-time document sharing and editing are just a few of the collaborative features that cloud platforms support. These resources improve student-teacher and student-student interaction, making learning processes more dynamic and engaging. For educational organizations, cloud

computing provides an affordable technology option. Schools can scale services up or down as needed and pay on a demand basis, doing away with the need to spend much on local servers and software licenses.

The future of education and AI:

The needs of schools, instructors, and students are changing, and so is the future of education. One aspect of this change that AI is contributing to more and more is the improvement of learning accessibility for students with disabilities.

For instance, AI can be used to make learning more individualized for every student by determining their areas of difficulty and offering them specialized guidance and assistance with practice sets in Google Classroom. AI can be used to elevate educators, automate administrative tasks, improve accessibility and provide real-time feedback to both students and teachers.

Challenges around AI in Education:

Although artificial intelligence (AI) has been heavily integrated into educational pedagogy, teachers and students are still dealing with issues that restrict AI's full potential in the classroom. Let's also examine how AI in education poses problems for both users and the educational system as a whole.

- **Lack of basic technological infrastructure:** One of the main obstacles to utilizing AI in education is the lack of technologies necessary to realize the revolutionary potential of AI in the classroom. The main obstacles that prevent AI from fully utilizing its potential in education are the lack of contemporary electrical equipment, inadequate information technology gear, inconsistent internet access, excessive data costs, and a lack of skills.
- **Lack of trained educators:** Teachers may have a lot of potential to teach, but using AI technology is a recent development. The process of examining the potential of AI-powered technology is hampered by the shortage of qualified educators who are tech-

savvy and proficient in these areas. Teachers must develop AI digital abilities and incorporate them into their teaching pedagogy in order to overcome this significant AI in education problem.

- **Privacy:** Privacy-Even following cyber security best practices does not ensure complete protection against cyber-attacks. Companies that produce AI products must adhere to industry security requirements to ensure that data and content processed by AI technology are used appropriately.
- **Equity:** While AI can deliver educational information anywhere in the world, a user must have internet connectivity to interact with the tool. This places an additional strain on already underserved populations, potentially pushing them further behind.
- **Ethics:** The ethical application of AI, as well as the risk of algorithmic bias, raises concerns. This bias happens when an algorithm generates findings that are systematically biased as a result of incorrect assumptions made throughout the machine learning process.

Advantages of AI in Education:

While AI is a relatively new technology, it's already being implemented in education in meaningfully transformative ways.

- **AI Personalizes Education**
AI may analyze a student's academic history and recommend curricula based on patterns. This artificial intelligence data collecting aids in properly identifying student needs.
- AI automates tasks for teachers and administrators. Educators in all positions can save time by offloading administrative duties including posting assignments, sending emails, assessing student mastery, and monitoring trends.
- AI analysis enables educators to quickly answer data questions.

PowerBuddy is an artificial intelligence analysis tool that helps IT leaders and IT teams connect with data using natural language queries. PowerBuddy allows school administrators to access rich data at any time to quickly and comprehensively answer inquiries regarding student performance and other topics.

- **AI provides smart educational content.**
Teachers and students alike might benefit from requesting AI-generated lesson materials or additional content that is interesting and useful. Teachers can construct full lesson or unit plans in significantly less time than it would typically take to create a new curricular unit.
- **AI Improves Accessibility and Equity in Education**
A learner may get high-quality instruction from anywhere in the world, and it can even be translated, which increases educational equity. Individuals with visual or hearing impairments can employ AI-powered conversion tools to make content more accessible.
- **AI provides data-based feedback to students.**
AI's data-driven feedback system enables open communication between teachers, families, and kids. It can increase student happiness, minimize or eliminate bias, and identify pupils who are not yet fulfilling subject standards. Quickly synthesizing data allows for timely updates to school community members on individual or district trends.
- **AI Supports Teachers**
Educators are indispensable, and AI for education is a valuable addition to this very human profession. For understaffed schools, AI can tutor students or recommend professional development to teachers based on instructional coaches' observations.
- **AI Offers 24/7 Training**
One popular use of AI in education is "study buddies" or "tutor bots." Conversational AI helpers can provide one-on-one attention to kids who do not

have anyone to speak with. Chatbots are able to answer student questions, check answers for accuracy, and even provide suggestions based on specific students' historical performance data.

• **AI Cybersecurity Enhances Data Privacy with Secure Algorithms**

Student data privacy is a significant priority for all educational institutions. AI-powered decentralized solutions enhance cybersecurity and data protection.

Conclusion:

The two main factors through which the education sector can leverage and adapt to AI:

- (1) Using AI to produce insights in real time to enhance learning outcomes.
- (2) Redeveloping and rethinking educational programs to make them more adaptable to AI-driven developments.

Educational initiatives to help them become more receptive to AI-induced changes. Some countries are capitalizing on the wealth of educational data that the Information Age has brought. These countries and their educational institutions have started gathering insights from massive amounts of data in order to create more personalized learning experiences. Of course, there are ethical issues to gathering and analyzing data from learners. As a result, any coordinated policy framework governing the use of AI in education must address this issue; education systems must clearly define national and worldwide AI strategy plans, which may be viewed as a platform for knowledge exchange and peer learning. This observatory will enable decision-makers to engage in more evidence-based dialogue.

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