

Transforming Learning Experience and Leveraging Artificial Intelligence for Education

B.M. Rajesh^{1*}, Suriya Prasath S.², Sanjaiy S.S.³

Abstract

This study shows how Artificial Intelligence can and is applied in the educational sector. Artificial intelligence in education (AIED) is one of the currently rising disciplines in educational technology, according to the 21st International Conference on Artificial Intelligence in Education held in 2020. The usage of AI is still unknown for educators in terms of how to utilise it for pedagogical purposes on a larger scale and how AI may affect teaching and learning in higher education. The influence of AI on education, as well as its benefits and drawbacks, are discussed here. It also provides a specific method for developing an AI-enabled platform for education, as well as the consequences of AI in education.

Keywords: Artificial intelligence (AI), technology, intelligent tutoring system, smart systems, ethical implications, privacy issues, data, future of education, AI in education report

INTRODUCTION

According to the 2018 Horizon study, experts predict that the usage of AI in education would increase by 43% between 2018 and 2022. AI use in education has been a topic of study for the past 30 years. According to Research and Markets, the worldwide AI Education market reached \$ 1.1 billion in 2019 and is expected to exceed \$ 25.7 billion by 2030.

The works of the psychologists B. F. Skinner, also known as the father of behaviourism, who was a professor at Harvard University from 1948 until his retirement in 1974, and Sidney Pressey, who was a professor at Ohio State University in the 1920's, are the forerunners on the application of AI in education [1].

ARTIFICIAL INTELLIGENCE IN EDUCATION

The International AIED Society (AIED) is an interdisciplinary group at the intersection of computer science, education, and psychology. The International Organisation, on January 1, 1997, the AIED society was established. It brings together scholars through the publication of the International Journal of AI in Education (IJAIED) and the AIED conference series [2].

*Author for Correspondence

B.M. Rajesh
E-mail: rajenlight@gmail.com

¹Assistant Professor, Department of Information Technology, Dr. NGP Arts and Science College-Coimbatore, Tamil Nadu, India

^{2,3}Student, Department of Information Technology, Dr. NGP Arts and Science College-Coimbatore, Tamil Nadu, India

Received Date: August 08, 2023

Accepted Date: August 11, 2023

Published Date: September 02, 2023

Citation: B.M. Rajesh, Suriya Prasath S., Sanjaiy S.S. Transforming Learning Experience and Leveraging Artificial Intelligence for Education. Journal of Intellectual Property Rights Law. 2023; 6(2): 25–31p.

Profiling and prediction, assessment and evaluation, adaptive systems, personalization, and intelligent tutoring systems are four areas of AIED in academic support services and institutional and administrative services. The field of artificial intelligence is both original and derivative.

Artificial Intelligence is a rapidly evolving technology that has begun to revolutionize educational tools and institutions. In the field of education, teachers have always played a crucial role, and with the advent of Artificial Intelligence,

their responsibilities are being transformed rather than replaced [3]. AI leverages advanced analytics, deep learning, and machine learning to monitor the progress and learning pace of individual students, enhancing the overall educational experience.

As AI solutions advance to higher levels, they play a crucial role in identifying gaps in teaching and learning, ultimately enhancing the effectiveness of education. By leveraging AI, educational processes become more efficient, personalized, and administrative tasks can be streamlined, allowing teachers to focus on providing understanding and adaptability, traits that are uniquely human and challenging for machines to replicate [4]. The collaboration between AI and teachers creates a powerful synergy that maximizes student outcomes, helping to bring out the best in every student.

THE IMPACT OF ARTIFICIAL INTELLIGENCE IN EDUCATION

In the future, AI is expected to impact virtually every aspect of our lives, and one area that will experience significant transformation is the education sector.

Teaching and learning are fundamental parts of life, and the current education system has ample room for improvement [5]. Traditional schooling methods have limitations in terms of flexibility, but with the integration of AI in education, this is set to change.

One of the main challenges in the education system is that the role of teachers, which is crucial for effective learning, is not easily scalable, and their services can be costly. Additionally, in some countries, teachers face heavy workloads with extensive paperwork and might not always receive the recognition they deserve.

AI has the potential to address these issues by offering personalized learning experiences for each individual [6]. By using skill assessments and understanding students' interests, AI can tailor a unique curriculum for every learner, optimizing their educational journey.

In conclusion, the future of AI in education holds immense promise to revolutionize the way we learn and teach, making education more flexible, personalized, and accessible to all, while also supporting and empowering teachers in their vital roles.

THE ADVANTAGES OF ARTIFICIAL INTELLIGENCE IN EDUCATION

Currently, young individuals often dedicate a significant amount of time to their smartphones or tablets. However, this also presents an opportunity for them to engage in short study sessions of around 10 to 15 min using AI applications. With the aid of Gesture Recognition Technology, AI is now capable of gauging the students' mood and receptiveness during lectures [7]. As AI continues to advance, it can interpret facial expressions and gestures to identify if a student is facing difficulties in comprehending the lesson. Consequently, the AI can adapt the teaching approach to ensure the student can follow the material more easily.

AI-powered machines enable the personalization of academic curricula, paving the way for global classrooms that are inclusive of visually or hearing-impaired individuals. Additionally, students facing health issues preventing them from attending classes can benefit from AI-supported learning [8]. In traditional education, teachers spend substantial time grading homework and tests, but with AI's intervention, these tasks become significantly faster and more efficient. Furthermore, AI plays a vital role in identifying learning gaps and providing suggestions on how to overcome them, ensuring a more effective and tailored learning experience for each student.

AI offers a range of resources to cater to individuals who speak different languages or have hearing or visual impairments. One such application is Presentation Translator, an AI-based system that provides real-time subtitles during presentations. For instance, Google Translator enables students to

read and hear content in their native language, facilitating better comprehension. Moreover, to promote interactive learning, modern technologies like Virtual Reality (VR) and gamification are highly beneficial, enhancing engagement and making the learning experience more immersive and enjoyable.

Indeed, advancements in AI have already enabled the automated grading of multiple-choice tests, and now, further progress is being made to extend this capability to evaluate written responses such as paragraphs and statements. By utilizing AI-powered machines for grading, teachers can save valuable time, eliminating the need for manually evaluating large volumes of written assignments. This newfound time can be redirected towards focusing on individual student assessment and development. As a result, teachers can provide more personalized attention to each student, fostering their growth and learning progress effectively. The combination of AI grading and personalized teaching enhances the overall educational experience and facilitates better student outcomes.

AI has the potential to transform admissions and enrolment processes in the future, although its full capabilities are still unfolding. With AI's assistance, students can receive support in their homework and test preparations from the comfort of their homes. The future of AI in education is promising, as it will be capable of catering to diverse learning styles. Thanks to Artificial Intelligence, tutoring and studying programs are becoming increasingly sophisticated and effective. Moreover, AI mentors specifically designed for learners are being developed, showcasing the vast possibilities AI brings to the field of education [9]. As AI continues to evolve, it holds great promise in revolutionizing the way we learn and teach.

AI in education can facilitate adaptive group formation, where students are grouped based on their suitability for specific tasks. Additionally, AI applications are capable of instantly grading student essays. These essays can be stored in a central database, allowing future essays to be compared with previous ones for assessment and feedback.

Artificial Intelligence in Education (AIED) is a computer-based technology that offers personalized, adaptive, and insightful teaching methods. AIED systems consist of key components, including:

1. Domain Knowledge Model: This model enables the system to complete tasks and allows students to assess how they contribute to finding solutions.
2. Student Model: This component represents the learner's developing knowledge and skills, helping the system tailor learning experiences to individual needs.
3. Model of Pedagogy: This component represents the system's teaching capabilities, ensuring effective instructional strategies are employed.
4. Interface Component: This serves as the communication channel between the learner and the AI system, facilitating seamless interactions and learning experiences.

In summary, AI in education brings forth innovative approaches to personalized and adaptive learning, leveraging various components to create an efficient and effective educational environment.

The integration of Voice Assistants is a highly valuable application of AI in education. This innovative technology includes popular voice assistants such as Google Assistant, Microsoft's Cortana, Apple's Siri, and Amazon's Alexa. Voice assistants enable students to engage in direct and interactive conversations with educational materials available on the internet and installed devices, all without the need for direct involvement from their teachers.

Through voice commands and queries, students can access a wide range of educational content, obtain instant answers to their questions, and receive personalized learning support. Voice assistants empower learners to take control of their own learning experiences, fostering independent and self-directed learning. This ground-breaking application of AI enhances accessibility, promotes curiosity, and streamlines the learning process, making education more engaging and efficient for students. As

the technology continues to evolve, voice assistants have the potential to become indispensable tools in the educational landscape.

Indeed, traditional methods of learning are gradually giving way to more modern and innovative approaches in various educational institutions, including some universities [10]. Instead of relying solely on printed study materials or complicated websites for campus-related information, institutions are now providing students with voice assistants as a more convenient and efficient alternative.

A notable example is Arizona State University, which is offering Amazon's Alexa to its new students. The aim is to furnish students with regular, concise, and precise institutional information to cater to their specific campus needs. Voice assistants like Alexa can quickly deliver relevant information and assist students with a wide range of queries, streamlining the access to campus-related resources and services.

By adopting such technological advancements, educational institutions strive to enhance the overall learning experience and improve students' access to essential information in a more intuitive and user-friendly manner. This shift towards voice assistants signifies the ongoing transformation in education, where technology plays a crucial role in facilitating a more personalized and efficient learning environment.

Exactly, Voice Assistants have a broad range of applications beyond educational institutions and can be utilized at home or in various non-educational settings to access learning assistance. Their primary objective in an educational context is to provide quick answers to common questions related to campus needs, schedules, and specific courses for individual students. By leveraging Voice Assistants, institutions can significantly reduce printing expenses for handbooks that are only used temporarily during the initial period of student enrolment, thus contributing to cost savings and environmental sustainability.

Moreover, the implementation of Voice Assistants can lead to a decrease in the demand for internal support, as students can access relevant information and services independently. As the technology advances and becomes more user-friendly, the adoption of Voice Assistants is likely to grow exponentially in the coming years, transforming the way educational institutions interact with students and providing a more streamlined and efficient learning experience.

With artificial intelligence's rapid integration into daily life, education systems are striving to cultivate more talent to keep up with the AI growth. AI is transforming education across all levels, from elementary to higher education and adult learning, by providing smart systems that facilitate efficient and goal-oriented learning experiences. The education industry is evolving with AI-powered curricula to cater to individual needs and enhance learning outcomes beyond just STEM subjects.

Intelligent Tutoring Systems (ITS) replicate one-to-one personal tutoring using neural networks and algorithms, making decisions tailored to individual students. AI is opening up numerous opportunities for higher education, offering students a wide array of possibilities. It has the potential to revolutionize the education sector, bringing about advanced changes. Additionally, robots can enhance language skills and generate digital content, while classrooms have already embraced digitalized teaching methods.

The surge in investments and growing interest in artificial intelligence will have a significant impact on universities in the future. Factors such as the expanding international student market, the democratization of higher education, and the financial pressure caused by the rising number of students seeking higher education will be key drivers for adopting AI in the higher education sector. These developments will pave the way for universities to harness the potential of AI to enhance teaching, learning, and administrative processes, ensuring a more efficient and inclusive educational experience for students worldwide.

AI-POWERED SOLUTIONS IN EDUCATION

In the education industry, there are numerous tech-driven solutions, including DreamBox, Khan Academy, and Achieve3000, along with several other AI-based educational platforms like Third Space Learning, Little Dragon, CTI, Brainy, Thinker Math, and Carnegie Learning. These platforms leverage AI technology to offer innovative and effective learning experiences to students.

The Third Space Learning system, developed in collaboration with scholars from London University College, provides valuable recommendations to enhance teaching techniques. It can give warnings when the teacher's explanation is either too slow or too fast, optimizing the learning experience. On the other hand, Little Dragon specializes in creating smart applications that analyse users' facial expressions or gestures to adapt the user interface accordingly. Additionally, Little Dragon develops educational games specifically designed for children.

Several companies, including Carnegie Learning and Content Technology, have embraced AI implementation in the educational system from Pre-KG to college level. They focus on developing high-level instructional design and digital platforms for testing, learning, and feedback purposes. CTI's online service, Cram101, utilizes AI to study textbooks and theoretical papers, extracting key highlights and generating practice tests and flashcards for student exercises.

Another platform, Netex Learning, is dedicated to applying new technologies in the learning world. It delivers digital learning solutions to educational institutions and companies, incorporating audio, video, and voice assistants in the digital curriculum. The growing presence of technology in education has led to speculations about the possibility of robots replacing teachers in the future. Augmented reality is also expected to become a part of the classroom experience, further enhancing the learning process.

CREATING AN AI-ENABLED EDUCATIONAL PLATFORM

Developing an AI platform for education involves six main steps:

1. *Step 1:* Study the existing solutions in the market to understand what is already available and how you can differentiate your platform.
2. *Step 2:* Consider the content of the application, making sure it is both interesting and interactive to engage learners effectively.
3. *Step 3:* Discuss the project requirements with the development team to ensure that the platform meets your specific needs and objectives.
4. *Step 4:* Thoroughly and properly test the application to identify and fix any potential bugs or issues.
5. *Step 5:* Promote the app to reach the target audience and gather valuable feedback after its release to further improve the platform.
6. *Step 6:* Regularly update the app to incorporate new features, enhancements, and improvements based on user feedback and evolving educational needs.

Absolutely, conducting a thorough analysis of existing solutions is crucial to identify areas for improvement and new features to make your platform stand out. By studying design ideas, you can ensure a visually appealing and user-friendly interface that enhances user engagement.

Choosing topics that are relevant and useful to the target audience, such as Medicine, Literature, Math, and others, will attract users who are seeking valuable educational content. Collaborating with tutors from various universities or colleges, as well as sourcing content from reputable courses and training programs, will enrich your platform with high-quality educational materials. Providing content that is valuable and beneficial to users will contribute to the success and popularity of your AI-based educational platform.

Before embarking on the project development, it is essential to clarify the business goals and project requirements to ensure a clear direction for the platform. Engaging an experienced team of software developers with expertise in Artificial Intelligence will be crucial to achieve the desired outcomes.

Creating a simple startup version of the application or platform is a prudent approach, allowing for quick user feedback and reviews. Based on this feedback, the platform can be regularly updated to add new content or features, improving the user experience and attracting more users.

Ensuring an excellent user experience is paramount, and this can be achieved by addressing any complaints or issues before the platform's launch. Qualified Quality Assurance Engineers play a crucial role in identifying and fixing bugs, ensuring a smooth user experience.

Regular platform upgrades based on user feedback will be instrumental in keeping the platform relevant, up-to-date, and meeting the evolving needs of the users. By focusing on user satisfaction and continuous improvement, the AI-based educational platform can thrive and succeed in the market.

DRAWBACKS OF ARTIFICIAL INTELLIGENCE IN EDUCATION

While AI presents tremendous opportunities in education, it also comes with potential risks and ethical implications that must be carefully addressed.

One significant concern is the possibility of AI replacing human teachers in an attempt to cut costs, especially in times of budget constraints like during the COVID-19 pandemic. The use of automated AI solutions might compromise the personalized support and guidance that students benefit from in a human-led learning environment.

Moreover, as AI takes on a more prominent role in education, there is a risk of reduced personal interactions between teachers and students. This decrease in direct human engagement could lead to students becoming overly dependent on technology and potentially losing essential social and emotional learning experiences.

Furthermore, there is a risk of technology addiction for students if AI-driven educational platforms are not managed appropriately. Overreliance on technology might hinder critical thinking and creativity, impacting learners negatively rather than supporting their growth.

To mitigate these risks, it is crucial for educational institutions and policymakers to strike a balance between AI adoption and human involvement. Integrating AI thoughtfully, while preserving the value of human interactions and personalized teaching, will be key to ensuring that AI enhances the learning experience without compromising learners' overall development and well-being. Ethical considerations and responsible AI implementation must be at the forefront of any AI-driven educational initiatives.

Faculty members, student counsellors, teaching assistants, and administrative staff may fear that the Intelligent Tutor System, an AI application, could replace them. Additionally, AI systems require significant amounts of confidential data concerning students and staff, raising serious privacy concerns. The high costs associated with the installation, maintenance, and repair of AI systems make them accessible primarily to well-funded educational organizations. Over-reliance on AI can lead to a lack of personal connections and potentially harm users in this regard. Furthermore, in the event of natural disasters or accidents requiring AI repairs, data loss can be unpredictable and worrisome. Indeed, it is beneficial for the educational system to start exposing students to technology that utilizes AI. The impact of AI is likely to be observed initially in the lowest education levels and gradually extend to higher education. However, the full extent of AI's impact in education will only be determined over time.

The primary goal of AI in education is to assist educators and make their work easier, not to replace them. By integrating AI, teachers can access valuable insights, personalized learning pathways, and administrative support, enabling them to focus more on individual student needs and providing a more effective and personalized learning experience.

As AI continues to evolve, it is crucial to strike a balance between technology and human involvement in the educational process. By leveraging AI as a supportive tool, educators can enhance their teaching methods and cater to diverse learning needs, ultimately empowering students to reach their full potential.

CONCLUSION

AI's impact in education is revolutionary, and its complete potential is still to be fully explored, as indicated by a report. Effective collaboration between AI developers, educators, and policymakers is essential to exchange insights and explore innovative possibilities. Although there are certain drawbacks, AI is undeniably intertwined with the future of education.

REFERENCES

1. IEEE. (2023). IEEE: The world's largest technical professional organization dedicated to advancing technology for the benefit of humanity. [Online]. [cited 2023 Aug 18]. Available from: <https://www.ieee.org/>
2. International AIED Society. About. (2021). [Online]. [iaied.org](https://iaied.org/about). [cited 2023 Aug 18]. Available from: <https://iaied.org/about>
3. Vitaly Kuprenko. (2020 Jan 31). Artificial Intelligence in Education: Benefits, Challenges, and Use Cases. [Online]. Medium. Towards AI. [cited 2023 Aug 18]. Available from: <https://pub.towardsai.net/artificial-intelligence-in-education-benefits-challenges-and-use-cases-db52d8921f7a>
4. Zawacki-Richter O, Marín VI, Bond M, Gouverneur F. Systematic review of research on artificial intelligence applications in higher education – where are the educators? *Int J Educ Technol High Educ*. 2019 Oct 28; 16(1): 39. Available from: <https://educationaltechnologyjournal.springeropen.com/articles/10.1186/s41239-019-0171-0>
5. Tsai S-H, Lin Y-P, Kuo C-CJ. MAI-Free MC-CDMA Systems Based on Hadamard–Walsh Codes. *IEEE Trans Signal Process*. 2006 Aug; 54(8): 3166–3179. doi: 10.1109/TSP.2006.875387.
6. Heick T. (2017 Jul 27) How Can We Improve Education? [Online]. Teach Thought. [cited 2023 Aug 18]. Available from: <https://www.teachthought.com/the-future-of-learning/how-to-improve-education/>
7. Daniel Faggella. (2019 Nov 21). Juumta S. Examples of Artificial Intelligence in Education: Current Applications. [Online]. Emerj Artificial Intelligence Research. [cited 2023 Aug 18]. Available from: <https://emerj.com/ai-sector-overviews/examples-of-artificial-intelligence-in-education/>
8. PC Solutions. (2019). Role of Artificial Intelligence in Improving Education Sector. [Online]. IT Solutions, Information Technology Consulting Services Company India; PC Solutions. [cited 2023 Aug 18]. Available from: <https://www.e-pspl.com/blog/role-of-artificial-intelligence-in-improving-education-sector/>
9. Dian Schaffhauser. (2020). Report: There's More to Come for AI in Ed. [Online]. The Journal. <https://thejournal.com/articles/2020/12/03/report-theres-more-to-come-for-ai-in-ed.aspx>
10. Upadhyay A. Artificial intelligence in education. *International Journal of Research Publication and Reviews Journal*. 2022; 3: 92–94. [Online] Available from: <https://ijrpr.com/uploads/V3ISSUE7/IJRPR5617.pdf>