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AI-powered education in India: Bridging the gap for all learners

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Abstract
As Artificial Intelligence (AI) is progressively permeating other sectors, our education sector stands no exception. AI is becoming a revolutionary force in the Indian Education System, presenting both new opportunities and unconventional limitations. While traditional teaching methods still dominate Indian educational institutions, there is growing recognition of the need to adapt to shifting academic demands and global trends. The purpose of this paper is to explore and understand the presence of AI in educational networks. The paper begins by discussing the current scenario of the conventional teaching setup, and how it is experiencing a gradual shift towards more student-centred application and the incorporation of modern pedagogical practices into it. Albeit, the indigenous knowledge setup is currently faced with several difficulties in terms of preservation, dissemination, and resurgence. The way knowledge has been imparted in India for decades now has made the presence of traditional setup an unaltered element of our education system. The combination of AI technologies and current advancements in educational technology is changing the face of higher education, opening up new options and changing conventional teaching methodologies. The paper tends to discuss such advancements and shed light on the efforts of the government, our education system, and educators that they have been taking jointly to incorporate "Digital Learning Aids" as a part of their academics. With the aim of reducing the knowledge gap between traditional practices and modern technology, this piece of research examines how artificial intelligence (AI) can be upkeep with Traditional Knowledge Networks (IKNs). The paper culminates by outlining probable future avenues for AI in aiding IKNs and how critical the presence of AI in education networks will be due to the technology singularity.

Keywords: Artificial intelligence, Indian education system, traditional teaching, Indian knowledge system, digital literacy

Introduction
Our education system has developed over time to meet the demands of a dynamic and quickly changing society since it is part of a rich cultural legacy and is influenced by historical traditions. The last innovation adopted at scale and that persisted over the course of decades in Indian Education is the "Blackboard and Chalk," and the enormous promise of AI to revolutionise and enhance education, to accelerate learning and teaching that offers us a great promise and also some perils which have been discussed in this paper. Though traditional teaching methods are challenged by AI, it also presents chances for innovation, better learning results, and greater efficiency. To address these issues and bring about beneficial changes in the educational environment, the Indian government has started miscellaneous reform initiatives. The National Education Policy (NEP) 2020, which was unveiled after years of discussion and consultation, aims to transform the Indian educational system by putting a focus on holistic and multidisciplinary learning, encouraging creativity and critical thinking, and utilising technology to improve teaching and learning outcomes. As stated by Dubey et al. (2022) [1], "Along with AI, Code Language and 3-D Graphics are also given a place in NEP- 2020 (Ministry of Education, 2020) so that in future, foundations of education can be visualised as technology oriented."

Traditional teaching frameworks in India
Education is not merely about books, lectures, and classroom studies; rather it is a way of life, a process that brings out the best in each one of us. For ages, blackboard education has been the prominent way of teaching-learning educational setup in India. Right from primary

to secondary and even in higher education, conventional teaching practices, such as Lecture Method, Demonstrations, Question Answer Sessions, Group Discussions, Homework Assignments, Rote Learning, Textbook-based Learning, Exams, and Assessments have been some of the most derived practices of knowledge giving in our country. But with recent developments in the field and the inescapable presence of social media, a pandemic such as Covid-19 could not impede our ever-evolving teaching and learning network. AI and media both played a crucial role in enabling remote learning during the COVID-19 epidemic and assisting students in continuing their education from home. This brought a substantial breakthrough in teaching-learning pedagogy. The entire educational framework became learner-centred, focusing more on the needs of the students rather than being teacher-centred. While teacher- centred teaching has traditionally been the preferred method when it comes to imparting knowledge in India, there has been a growing understanding of its shortcomings too. There has been a drive recently to adopt more active learning, critical thinking, and problem-solving techniques that are student-centred and participative. To improve the standard of education in India, educators and policymakers are progressively looking into how to incorporate more learner-centred and technologically enabled techniques. This change attempts to give students more agency, encourage creativity, and enhance understanding of ideas beyond rote memorization.

AI in Education

Over the years, there has been a slow but steady shift in education from the chalkboard to the whiteboard, and now most educational institutions use projector screens. To integrate AI-driven advancements with the preservation of good pedagogical practices, mentorship, and human contact, higher education institutions, and instructors must critically assess and strategically integrate AI technologies. A wide range of tools and technologies made possible by AI has the potential to revolutionise education. These tools use deep learning and neural networks to improve managerial, educational, and learning operations. Certain ways in which AI is in use in Higher Education include Identifying Plagiarism, Upholding Exam Integrity, Chatbots for admission and assessment, Academic Research, Transcription of Faculty Lectures, Virtual Discussion Forums, etc. Though there are some criticising the presence of AI in education, the recent advancements introduced by machine learning algorithms have made things simpler for both students as well as the educators.

AI and academic work have long been in a codependent relationship, with each influencing and complementing the other in various ways (Wang, 2020) [4]. Artificial intelligence has played a pivotal role in aiding educational research and streamlining academic tasks. One notable contribution is its assistance in data analysis and interpretation, allowing researchers to extract valuable patterns and insights from extensive datasets that would have been unattainable through manual methods. These tools have the capability to customise learning experiences for students, offering them personalised instruction and feedback that aligns with their specific learning styles and abilities. Additionally, artificial intelligence can examine student data to pinpoint areas where they may be facing difficulties and offer tailored interventions to assist them in enhancing their skills. This technology has the potential to transform education by enhancing student engagement, effectiveness, and accessibility across all age groups and skill levels. These AI-powered tools have revolutionised education by providing personalised learning experiences, real-time feedback, and adaptive instruction, catering to the individual needs of students.

The symbiotic connection between AI and Education has been reinforced by recent advancements. Notably, there has been an increasing focus on leveraging AI to improve instructional design and curriculum development. AI has been utilised in student assessment and grading, providing objective and efficient evaluation methods. Furthermore, AI has also led to advancements in the field of intelligent tutoring systems. These systems use AI algorithms to provide personalised and adaptive instruction, guiding students through their learning journey and offering targeted interventions when needed. Not only have the advancements in AI enhanced the efficiency and effectiveness of academic tasks, but they have also unveiled fresh opportunities for exploration and creativity. AI has also had a significant impact on academic integrity and honesty. For example, AI-powered plagiarism detection tools like TurnItIn have been instrumental in promoting academic integrity by identifying instances of copied or unoriginal work.

Conversely, ethical dilemmas arise in the realm of AI within the educational sector. These encompass concerns regarding data privacy, algorithmic bias, and the ethical handling of student information. Efforts are being made to address these concerns and develop guidelines and standards for responsible and equitable use of AI in education. Overall, the relationship between AI and academic work has been mutually beneficial (Chen et al., 2020) [2]. AI and academic work have been codependent for a while now, with AI techniques providing smart and efficient tools for students. These tools can assist students in tasks such as translation and illustration, potentially reducing their engagement in inquiry processes that promote deep learning. Some recent developments in AI and Education include the use of virtual reality and augmented reality technologies to create immersive learning experiences. These technologies allow students to explore complex concepts and scenarios in a hands-on and interactive manner, enhancing their understanding and retention of knowledge. Moreover, there is a growing trend in educational settings towards the use of AI-powered chatbots. These chatbots act as virtual assistants, providing immediate assistance and answers to student questions. This not only enhances accessibility for students but also lightens the workload for educators. Additionally, AI technology has led to the development of intelligent tutoring systems that utilise algorithms to deliver personalised and flexible instruction. These systems guide students through their learning process and offer specific interventions when necessary. As a result, academic activities have become more efficient and effective, while also creating opportunities for research and innovation.

Current Scenario

AI tools have brought about substantial transformations in the conventional teaching and learning landscape within the Indian Education System. By facilitating personalised learning, automating administrative tasks, and bolstering the effectiveness of educators, AI has revolutionised the way education is imparted.

Here is a list of a few AI-driven teaching aids used globally-

1. **Brainly**: A social networking platform for school questions.
2. **KidSense**: A voice-to-text tool with algorithms developed to recognise young learners' often more difficult-to-translate speech is part of KidSense's line of AI educational products for kids.
3. **Cognii**: AI-based tools for K–12, higher–education, and corporate training organisations, including a virtual learning assistant.
4. **Cram101**: With the help of artificial intelligence (AI), "any textbook can be turned into a smart study guide containing chapter summaries, endless true-false and multiple choice practise tests, and flashcards all drill-down to a specific textbook, ISBN number, author, and chapter."

Though the idea of making a shift from result oriented teaching framework to research and skill-based learning is not new. Benjamin Bloom, an educational psychologist, developed a framework known as Bloom's taxonomy in the 1950s. According to this framework, an understanding of fundamental facts serves as the foundation for more complex learning processes like analysis and evaluation. A wider change in the function of teachers is reflected in these shifting attitudes. There is a growing consensus that the extraordinary range of present and potential benefits will prevail despite the fact that there is still much debate about the merits and drawbacks of enacting artificial intelligence in the field of education, including the decentralisation concerns and the ethical issues discussed above. But the teachers today are not just the gatekeepers of information but also the facilitators by allowing their students to learn how to filter and trust the right source of information.

AI & Opportunities in Education

In his work mentioned how one of the compelling motives for AI adoption in education has increased the participation of students from different geographical locations for courses in higher education given at a central place, coupled with limited funding. Artificial Intelligence has offered various opportunities in the field of education such as-

1. **Use AI to automate fundamental tasks in schooling:** Artificial intelligence in educational institutions allows for simpler and more efficient managerial tasks. The screening process can be programmed using AI to cut manual labour, downplay errors, and accelerate the enrolment process. Monitoring attendance, assigning grades and assessments, managing resources, and many other activities may also be included. It can automate financial procedures like billing and fee collecting, which helps cut down on manual labour. Additionally, chatbots and virtual assistants powered by AI can automate repetitive communication duties like responding to frequently requested queries and providing details on deadlines, scheduling, and other processes.
2. **AI-based individualised learning:** Students can receive individualised instruction from AI systems. Each student can study in their own way, according to their comprehension and needs, with personalised instruction. Teachers can create a personalised study plan for each student by first assessing their needs. As artificial intelligence continues to advance, it's likely that machines could soon be able to read students' facial expressions as they learn topics, determine whether they are having any trouble understanding them, and modify their teaching methods accordingly. Such things are not currently conceivable, but with AI-Powered machinery and software, they might be in the near future.
3. **Helpful feedback to students and teachers with AI-driven programs:** AI can provide feedback to teachers and students regarding the course's level of success in addition to assisting students in learning customised courses that are tailored to their needs. Several online course providers are currently using these AI algorithms based on feedback to analyse student progress and notify professors of any serious performance issues.
4. **Creating insightful material using AI**
   Digital Lessons: Everything is going digital these days, including education. With customising choices, e-books, study materials, bite-sized courses, and many other things made possible by AI, digital learning is becoming increasingly popular in institutions. **Information Visualisation:** It is considerably more effective to visualise information than it is to merely listen in order to better absorb and retain it. The study data can be interpreted in novel ways with artificial intelligence through visualisation, simulation, and web-based study environments.
5. **AI-driven tools for Feedback amongst teachers and students:** In addition to assisting students in learning a customised course that meets their needs, AI can also provide teachers and students with feedback on the course's level of success. Currently, some online course providers use these AI algorithms based on feedback to analyse student progress and notify professors of any serious performance issues.
6. **AI content accessible to all:** Universal access to study materials is one of the great applications of artificial intelligence in digital learning in education. With universal access, each student may learn wherever they are and whenever they want. Without having to wait for the instructor, students can explore topics anytime they wish to learn more. Additionally, students can access top-notch materials and courses from around the globe at their location alone without leaving their homes.
7. **Natural Language Generation (NLG):** By analysing data, comprehending context, and adhering to specified rules, NLG algorithms can produce language that resembles that of a human. AI can be used to automatically create comprehensible and approachable tutorials, explanations, and educational content.

AI & Challenges in Education

The current education system has benefited greatly from AI, but still, there are some issues that need to be resolved.

1. **Ethical Issues:** The application of AI in education involves issues of privacy, data security, and bias. Large-scale student data collection and analysis raises questions regarding how the data will be utilised, safeguarded, and shared. Furthermore, biases existing in the training data used to develop AI algorithms run the risk of being perpetuated, which could result in discrimination or unfair treatment.
2. **Skill gap & teacher training:** Education professionals must acquire new skills and abilities in order to integrate AI. Many teachers might not have the

requisite expertise to use AI tools effectively or comprehend the consequences of AI in education. To achieve successful implementation, it is crucial to close the skill gap and offer teachers enough opportunities for professional growth.

3. **Cost and Infrastructure:** Putting AI technologies into practice frequently necessitates a large investment in technical support, hardware, software, and infrastructure. Lack of funding may make it difficult for districts or schools to use AI tools and successfully integrate them into the educational system.
4. **Overreliance on Technology:** A risk of overreliance on technology at the expense of a well-rounded education exists even though AI can improve learning experiences. Maintaining a balanced approach is crucial, incorporating AI technologies with other instructional modalities, practical exercises, social connections, and inventive problem- solving.

Conclusion

Artificial Intelligence is revolutionising the process of learning and education all over the place. The machine learning algorithm is swiftly evolving how students and teachers approach their everyday tasks, whether through the development of intelligent virtual assistants, individualised learning experiences, or new types of digital content. The adoption of AI and machine learning in education may be a little slower than expected, but the changes are already beginning and will continue. In this paper, we have explored the current state of AI-powered education in India and its potential in bridging the gap for all learners. The Indian Education System presently emphasises the need for innovation and development to keep up with the rapidly changing demands of the world. Overcoming these obstacles and putting in the best practices, AI could become a powerful tool in customising individualised and comprehensive educational experiences for every student. Furthermore, AI holds the potential to transform education on a broader scale by streamlining administrative duties, boosting student participation and teamwork, and fostering flexible, adaptable learning environments.

Artificial Intelligence is being investigated for its potential in education to improve materials, provide intelligent tutoring, create personalised assessments, and facilitate individualised learning. Successful integration of AI into the Indian Education System would also demand spending more on teacher training and capacity building to give educators the skills and knowledge they need to properly use AI tools. The transition to a learner-centred, technology-enabled approach necessitates striking a balance between the intimate knowledge educators provide and the assistance of artificial intelligence (AI) resources. Education in India could undergo a paradigm shift by conscientiously installing machine learning and artificial neural networks, using them alongside human expertise, and building a generation of well-prepared people who are able to face the challenges of the future. AI's presence in education shall continue to increase as technology develops and progresses, giving students access to a more enriching and diverse learning environment.

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