e-learning:
Artificial Intelligence Transforming the Learning Landscape in India

Indeed, the advent of Artificial Intelligence (AI) is transforming various sectors globally, and education is no exception. In India, a country with a diverse and vast educational landscape, AI is revolutionising e-learning, especially in areas where access to quality education has been historically limited. This article explores how AI is reshaping e-learning in India, the role of significant investments and initiatives, and the potential of AI to bridge educational gaps in India.

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Amid the bustling realm of education technology or EdTech, as it is commonly known, India is undergoing a significant transformation in e-learning driven by Artificial Intelligence (AI). The global adoption of technology in the education sector is vastly changing the way we teach and learn. With so much content available at the click of a button, learning has been revolutionised and AI is proving to be a game-changer, bringing significant advancements in teaching methodologies, personalised learning, and overall student engagement. AI in education aims to achieve optimal outcomes for students by leveraging enormous data and combining it with the human interface that a teacher brings in the learning pedagogy.

In India, the integration of AI in education has showcased remarkable potential, reshaped traditional methods, and brought forth a new era of personalised learning and innovation. India holds an important place in the global education industry and has one of

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the largest networks of higher education institutions in the world. According to a recent UNESCO report, the AI market in India is expected to reach $7.8 billion by 2025. Furthermore, AI in the education market would to be valued at around $20.54 billion by 2027.

During the pandemic, India underwent a significant evolution from basic online courses to comprehensive digital education platforms. When the country's dropout rate was more than tripled—from 1.8 percent in 2018 to a staggering 5.3 percent in 2020, e-learning platforms presented promising models of learning from home, school and from anywhere. This shift in learning pattern predominantly impacted children hailing from marginalised communities further exacerbating existing inequalities.

The Evolution of E-Learning in India: Moving towards AI

In recent years, e-learning in India has undergone a remarkable transformation, significantly impacting the educational landscape especially the vast underserved rural areas. This evolution, driven by technological advancements and increased internet penetration, has been pivotal in addressing the educational needs, where traditional learning methods often fall short.

During the COVID-19 pandemic, e-learning experienced a sudden popularity and adoption as traditional learning centres were forced to remain close. The sudden shift to remote learning from traditional setup highlighted the effectiveness of e-learning platforms and tools. Educational institutions, from elementary schools to universities, quickly transitioned to online learning to ensure continuity of education. Teachers and professors embraced various e-learning tools and platforms to deliver lessons, interact with students, and assess their progress. Video conferencing software such as Zoom, Microsoft Teams, and Google Meet which were go-to connecting tools for corporates became the main medium for conducting virtual classes and facilitating real-time communication.

To notch up Edtech game, a lot of startups and platforms have started using AI. This shift is very evident as AI promises to provide a personalised, adaptive learning experience. AI-driven platforms analyse student data to tailor educational content, ensuring that each learner progresses at their own pace. Automated grading and feedback systems streamline assessments, allowing educators to focus on instruction. Additionally, AI-powered chatbots and virtual tutors offer real-time assistance, enhancing student engagement and support. With such an intriguing platter of offerings, AI certainly will be a game changer for Education sector.

Building LLMs for better Learning

Every student is different, and each has their own pace of learning. A notable study --2 Sigma problem-- published in 1984, evaluated classroom teaching in three different settings: conventional teaching, mastery teaching, and tutoring. While tutoring and mastery teaching significantly improved students' overall grasp of the subjects compared to conventional teaching, investing in education to enhance the teacher-to-student ratio is challenging for developing countries like India due to limited resources and constrained budgets. Use of AI in EdTech, specifically in large language modelling(LLM), provides a perfect solution to this problem.
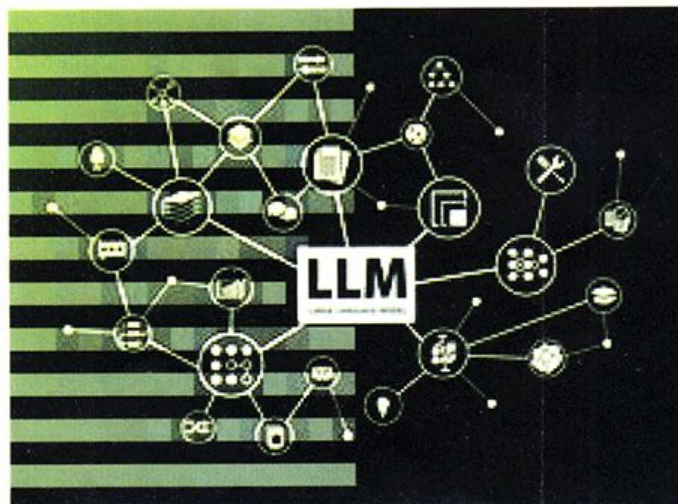
Large Language Models or LLMs are the building blocks of AI. They enable AI systems to interact with humans more naturally, enhancing applications like chatbots, virtual assistants, and automated content creation. Building a versatile and adaptable LLM makes them valuable across different fields, from customer service to education. Moreover, LLMs can process and analyse vast amounts of text, providing insights and facilitating decision-making. Their ability to generate human-like responses and understand context significantly boosts the efficiency and effectiveness of AI applications.

These language models are highly adaptable. Depending on their training data, they can serve various purposes, including acting as personal tutors in educational environments. For example, a model trained on a STEM curriculum can provide individualized attention to students through a conversational interface, helping them to learn at their own pace. They can also generate personalised tests based on the student's progress, addressing a logistical challenge in traditional classrooms. Such solutions can specifically be designed for students in underserved regions of the country where the learning gap is always high. Furthermore, the Internet's vast educational content can be inaccessible due to language barriers, especially for rural populations. Generative AI advancements can easily translate content into most spoken languages in the country, thereby ensuring access to educational content.

Champions of Change

Last year, at a global conference, Sam Altman, Co-Founder, ChatGPT said, "AI will continue to get way more capable and will become ubiquitous as time goes on". He further added healthcare and education are most ripe for innovation, and education is poised to benefit from personalised learning experiences especially through AI disruption.

While traditional learning still holds, adding technology to education will complement the existing learning means. Today more than 2 million students are enrolled on Indian e-learning platforms like Unacademy, Toppr, Simplilearn which is expected to increase two-fold by next year. Some of these platforms are also using technology like AR (Augmented Reality) & VR (Virtual Reality) into the content to enable a more immersive leaning.

While some platforms are just working on e-learning, startups like Miko and Questt are using more immersive technology to become game changers. Miko is an AI-powered companion robot for children that can talk, respond, educate, provide entertainment, and understand the child's needs, emotions, likes, and dislikes integrating with a companion application that allows parents to control and manage the settings. On the other hand, Questt, is AI-based platform offering study planning tools for students. It offers study plans comprising a timetable, quizzes, and learning material. It offers solutions such as a question bank for assigning homework tasks and insights and analytics to distinguish right and wrong answers.

Other startups like Embibe and Toppr are using AI to enhance test preparation by offering personalised practice tests and detailed performance analytics. Embibe's AI-driven platform provides in-depth analysis of students' strengths and weaknesses, while Toppr's adaptive learning technology ensures that each student receives customised study plans. These personalised approaches help build a differentiated learning curve as per the pace of the learner thereby creating significant benefits over the traditional classroom-based approach.

In rural areas, startups such as Doubtnut are breaking language barriers by offering educational content in multiple Indian languages. Doubtnut uses AI to provide instant video solutions to students' queries, making learning accessible to those with limited resources. In a country like India which has 22 Schedule

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languages and many dialects, this can be a game changer in terms of reaching out to potential learners in their own language.

These startups are not only enhancing the quality of education but also addressing the digital divide by making learning resources available to students in remote and underserved areas. By integrating AI with education, these startups are transforming the e-learning landscape in India, ensuring that every student has the opportunity to succeed, regardless of their location or background.

AI Penetration in India

Recognising the potential of AI in addressing challenges of accessibility, education, and resource limitations, the Government of India (GoI) announced National Program for AI with a view to guiding the research and development in new and emerging technologies. In 2020, National Artificial Intelligence Portal or 'INDIAai' was launched as a one-stop digital platform for AI-related developments in India. Following, in Dec 2023, Ministry of Electronics and Information Technology (MeitY) submitted the first edition of India-AI report. According to the report, AI will be the kinetic enabler of India's digital economy and make Governance smarter and more data-led. AI is expected to add USD 967 billion to the Indian economy by 2035 and USD 450–500 billion to India's GDP by 2025, accounting for 10% of the country's USD 5 trillion GDP target.

While these initiatives have longer timelines, significant impact has been brought in by *"Bhashini"*, a government-led project aimed at breaking language barriers through AI. Bhashini leverages AI and natural language processing to create digital solutions across multiple Indian languages, ensuring inclusivity and accessibility for rural populations.

Bhashini focuses on developing AI-driven tools that translate and interpret regional languages, making digital content and services available in local dialects. This initiative is particularly vital for frontier and tribal areas, where most communication is in the local language and very less resources are allocated towards information and services. By providing AI-enabled translation and transcription services, Bhashini is trying to ensure that people across in these backward and less accessible regions can access various government schemes, consume educational content, and better use the healthcare infrastructure while communicating in their native languages.

Atal Innovation Mission (AIM), a flagship program of NITI Aayog has been a pioneer in disrupting the Indian education system. With more than 10,000 Atal Tinkering labs (ATLs), AIM has been able to impact more than 1.1 million school students with concepts of innovation, tinkering and entrepreneurship. An ATL is typically a space maker for students to play and tinker with their ideas within school premises. To inculcate a mindset of innovation in young entrepreneurs, ATL has developed curriculum focusing on robotics, 3D printing, computational thinking, space, drones, IoT and AI among others, starting from basic to advanced level. All these courses and resources are available in online versions through www.aim.gov.in. Further AIM with CBSE and Intel partnered together to develop 'AIoT Integration Curriculum' to make tinkering and AI a part of the formal pedagogy. In 2024, AIM, CBSE and Intel jointly launched 'India AI Impact Festival' with an aim to foster AI readiness among students, educators and academic institutions, promoting innovation and problem-solving skills in an inclusive manner.

Equity and quality of education

As India marches towards **becoming a $5 Trillion** economy in the world, it would also be imperative to address the issues of inequity that plague the education sector. While a number of public schools are well endowed (as in the case of Kendriya Vidyalayas

or Navodaya schools), there are thousands of public schools that are still struggling to ensure desired educational results. The main reason remains wide disparities in the infrastructure and resources of the schools across the regions of the country, mainly in the backward Aspirational Districts.

A stratified education system significantly impacts the quality of education by limiting access for all students, especially the most marginalised. This barrier prevents these students from fully participating in school, enjoying the educational journey with proper teacher guidance, classroom resources, and necessary infrastructure, and successfully completing their secondary level education. Initiatives aimed at improving education quality, such as remedial teaching and bridge courses should be a focus of state governments who can partner with local NGOs and Gram Panchayats to help the targeted students.

Technology can be the enabler in ensuring democratisation of the education, and AI can play a big role in it. We have seen how tele-medicine enabled access to doctors in terms of healthcare for far flung areas of the country. In a similar fashion various AI models can be built for students across backward areas in the country and bundled with vernacular content would ensure that each student is able to make the most of the learning opportunities at par with some of the cities.

Responsible AI

Artificial intelligence (AI) is here to stay. Most businesses are evolving with the advent of AI and same shall be the case for learning as well which incudes for government as well as private enterprises. AI is

Union Cabinet approves ambitious **IndiaAI Mission** to strengthen the AI Innovation Ecosystem

The IndiaAI Innovation Centre

A component capturing India's social, cultural and linguistic diversity to undertake the development and deployment of:

- Indigenous Large Multimodal Models (LMMs)
- Domain-specific foundational models in critical sectors

Cabinet Decision: March 7, 2024

transforming creative, legal, technical, educational, language, and medical sectors and as young people grow up in an AI-driven world, educators, mentors are uniquely positioned to equip the next generation of leaders with the skillset and mindset to use and build AI responsibly.

Responsible AI in the education sector involves creating systems that are fair, transparent, and prioritise student welfare. There is also an element of data privacy where organisations have to ensure compliance as enormous data gets shared to build customised AI models. To maintain ethical standards, regular interventions from the Government are necessary. It is important that educators and policymakers in India continuously monitor AI applications across the globe and build policies and standards that take into account what is best for India.

Conclusion

Artificial Intelligence or AI is transforming e-learning in India, making education more personalised, interactive, and accessible. Increased opportunities for generating ideas and receiving instant feedback, which can support and empower students to analyse topics they are passionate about, is increasing their interest in global platforms like ChatGPT, Gemini and other.

Enhanced availability of assistive technologies to meet the needs of each student, including students who may not have fully participated in education due to geographic, political, technological, or personal constraints. AI gives students greater access to adaptive technologies, which empower young people with disabilities, language barriers, or other challenges through speech recognition, text-to-speech options, the ability to set their own pace, and more. In addition, just as the internet has opened borders and deepened opportunities for global fellowship, AI promises to enable international collaboration unhampered by language, cultural, and geographic differences.

Through initiatives like the India AI Mission, investments by global tech giants, and the efforts of innovative startups, AI is bridging educational gaps and democratising access to quality education. While challenges remain, the future of AI in e-learning is bright, with endless possibilities for innovation and improvement. As AI continues to evolve, it will play a central role in shaping the future of education in India, empowering learners and educators alike to achieve their full potential. ❑