AI in Public Education: A Brief Case Study and Future Pathways

S Sreekanth

Case study: A lesson on factorisation

A few days back, I sat with my son, attempting to help him navigate the concept of factorising polynomials in mathematics. We were working through the equation:

$a^2 - 5a - 6$

There was some prior work on why a certain method works for this and so we jumped straight into the method. First, we started by multiplying the coefficient of a2 (which is 1) and the constant term (-6), giving us -6. After this, we needed to find two numbers that, when multiplied, equalled -6 but, when added, would give us -5.

At first, he felt that 3 and 2 seemed obvious candidates – after all, they multiplied to 6. But then it became clear that the signs of numbers must be opposite to get a multiple of -6. With that, they will not add up to -5. That 1 is a factor of all numbers and the number itself was then recollected. So, you get 1 and 6, one of which needs to be negative. Now we came to an interesting part. Which one is to be kept negative? Things are a bit involved by now and so the attention doesn't come on the obvious point. He pondered a bit and at this point I asked: “to get -5 on addition, is it the bigger number that needs to be made negative or the smaller one?” This was like a small “wow” moment, even if it was obvious.

As I observed him solving subsequent problems, he started remembering this point, which he knew from earlier but just got reinforced.

Reflections from the case

This experience brings to light a critical point about mathematics education. While mathematical concepts like factorisation seem straightforward, they involve complex cognitive steps that require substantial focus and understanding. Mathematics is not just about getting the right answer; it's about grasping the underlying patterns,

reasoning and processes that lead to the solution. These moments of realisation, like my son's "wow" moment, are what make mathematics engaging and meaningful for learners.

Yet, such moments are fragile. They require constant support, guidance and interaction with the teacher. Without enough of these moments of clarification and attention, students can lose interest or fail to build the foundational skills needed for further learning. This is not just true of Mathematics, but of all subjects. This underscores the importance of consistent, personalised teaching methods - something that is often challenging in large, resource-constrained classrooms.

How does this case relate to AI in education?

This case study, while rooted in mathematics, has broader implications for how we think about the role of artificial intelligence (AI) in public education. It raises a crucial question: If learning depends so much on engagement and personalised support, where does AI fit in? Can it facilitate such moments of learning, or does it risk reducing education to mere content delivery? AI has the potential to assist teachers in many ways, but its effectiveness hinges on how well it supports - or replaces - the crucial human interactions that make learning meaningful. Understanding AI's role requires distinguishing between tools that enhance learning and those that oversimplify it. AI has been widely heralded as a transformative force in education, with its potential to revolutionise both teaching and administration. However, in the context of India's government schools, AI faces unique challenges that must be addressed before it can realise its potential.

In the ideal scenario, AI could be used to personalise learning, assist in lesson planning and help teachers assess student performance in real-time. But, as the case study illustrates, mathematics learning - and education in general - requires more than just automated responses or content delivery. It demands human interaction, guidance and personalised attention. The question then becomes: can AI support these processes without losing the essential human touch?

Education in general - requires more than just automated responses or content delivery. It demands human interaction, guidance and personalised attention.

Different approaches of AI in education: Generative AI and predictive AI

As we explore the role of AI in education, it is important to note that there are many approaches to the usage of AI. However, for the purposes of this article, we will focus on Generative AI and Predictive AI, as these are particularly relevant to discussions on public education.

Generative AI: Creating content and simulating interaction

Generative AI refers to AI systems designed to generate new content - whether text, images, or even interactive responses - based on patterns learnt from vast datasets. In education, this technology can be used in different ways:

- Generative AI can automate report generation and assist in drafting policy recommendations by analysing historical and multi-source data.

- Chatbots, powered by Gen AI, can assist with academic support, lesson planning and administrative tasks.

While highly capable, it can be unreliable and has its limitations. When you start using this tool extensively, you begin to understand its limitations. Generative AI can sometimes produce incorrect or misleading information (hallucinations), where the system generates false or fabricated information while presenting it as factual. Generative AI makes it easier for students to generate essays, homework, and even exam answers, raising concerns about impact on learning and plagiarism.

AI models generate responses based on statistical patterns learnt from training data, which is often sourced from the internet. This can introduce biases or gaps, leading to culturally skewed or factually incorrect content in educational materials, e.g., AI-generated history lessons might reflect dominant perspectives while overlooking marginalised viewpoints. More importantly, while it can mimic conversations, it cannot replace the depth of human intuition, patience, and emotional connection that a good teacher provides.

Predictive AI: Identifying patterns and supporting decision-making

Predictive AI, on the other hand, focuses on analysing data to identify patterns, anticipate outcomes, and support decision-making. In education, predictive AI is used to:

Identify students at risk of falling behind

By analysing test scores, attendance records, and engagement levels, AI can flag students who may need extra support.

Help teachers tailor instruction

Predictive AI can suggest adjustments to lesson plans or recommend targeted interventions by assessing which concepts students struggle with the most.

Improve administrative efficiency

Schools can use predictive AI to optimise resource allocation, such as identifying which subjects need more instructional time or where additional teacher support may be required.

Limitations of predictive AI in public education

While predictive AI is often marketed as a powerful tool for forecasting outcomes, its application in education comes with significant challenges:

Inherent uncertainty in predicting human behaviour

Social processes, including student performance and dropout rates, are influenced by unpredictable life events. No AI model can fully account for unexpected shocks like personal crises, sudden opportunities, or changes in a student's environment.

Bias and inequality

Predictive AI can reinforce existing inequalities, as it often relies on historical data that may reflect systemic biases related to gender, socioeconomic status, or regional disparities. This can lead to flawed recommendations, disproportionately impacting marginalised communities.[1]

Overstated accuracy and data leakage

Many predictive AI tools appear highly accurate because they are tested on the same type of data they were trained on, a problem known as data leakage. This inflates performance metrics, making the AI seem more reliable than it actually is when applied to new, real-world situations.

Moral and ethical concerns

Using AI to make life-altering decisions, such as predicting which students are "at risk" of failing or dropping out, raises ethical questions. Such predictions can

influence resource allocation, inadvertently disadvantaging students based on incomplete or biased data.

Feedback loops and self-fulfilling prophecies

AI predictions can shape educational decisions in ways that reinforce initial biases. If a model flags a student as "unlikely to succeed," they may receive less support, making failure more likely, a self-fulfilling prophecy, rather than an objective forecast.

Social processes, including student performance and dropout rates, are influenced by unpredictable life events. No AI model can fully account for unexpected shocks like personal crises, sudden opportunities, or changes in a student's environment.

Challenges in AI implementation

While there is undeniable potential for AI in education, particularly in areas such as administrative efficiency and data analysis, its application in the classroom setting is not without challenges.

The reality of India's public school system

Issues such as language barriers, lack of infrastructure and limited internet access - makes the widespread use of AI tools for personalised learning and teaching assistance a goal for the medium to longer term.

Language barrier

Many AI-powered tools use models trained to work better in English, yet a significant portion of the Indian student population in government schools speak regional languages. For AI tools to be effective, they must be adapted to the linguistic diversity of the country, a challenge that many developers and policymakers are still working to overcome.

Infrastructure limitations

These further complicate the adoption of AI. While AI-powered systems may work seamlessly in well-resourced schools, government schools in many parts of India often lack the basic technological infrastructure needed to support such systems. In rural areas, where internet connectivity is inconsistent, even the most innovative AI systems may struggle to function effectively. (It is acknowledged that on-device AI is emerging as an interesting answer to this problem, but the quality of such systems is still being improved)

Given these challenges, it seems more realistic in the short term to focus on an assistive role for AI for Teachers and Administrators. AI can be leveraged to help teachers in various ways and play an assistant's role in tasks such as attendance and report generation - time-consuming tasks and often prone to human error. This would free up valuable time for teachers, enabling them to focus on teaching and student engagement.

Finding the right balance: AI as a tool, not a replacement

Both Generative and Predictive AI offer exciting possibilities, but their role in education must be approached with caution. Generative AI, despite its imperfections, is a rapidly improving tool with practical applications. Predictive AI when tied to student outcomes, on

the other hand, is more problematic due to its potential to reinforce biases and misinterpret complex human realities. It can however be used in promising ways when not tied to student outcomes. The issue with Predictive AI for predicting student outcomes isn't just about technological limitations, it's the fundamental nature of education itself. Learning is dynamic and shaped by personal growth, social influences, and unexpected changes. Just as election forecasts cannot guarantee results, past educational data alone cannot reliably predict a student's future.

Generative AI, despite its imperfections, is a rapidly improving tool with practical applications. Predictive AI when tied to student outcomes, on the other hand, is more problematic due to its potential to reinforce biases and misinterpret complex human realities.

AI as a teacher's assistant

In the first phase of AI adoption (say the 2025-2026 period), one of the most promising applications of AI could be as a teacher's assistant. AI can help teachers in various ways without replacing their role. Some illustrations where AI can assist Teachers:

Automating administrative tasks

Reducing the burden of attendance tracking, and report generation so teachers can focus on instruction.

Generating personalised learning materials

Creating adaptive exercises and explanations tailored to individual student needs.

Assisting with lesson planning

For instance, AI can assist in lesson planning by providing resources and ideas based on curriculum guidelines, although it should not be expected to provide ready-made lesson plans.

While AI cannot replace the nuanced understanding and empathy teachers bring to the classroom, it can be a valuable tool to support their efforts.

AI as an educational administrator's assistant

Beyond the classroom, AI's most effective role may be in assisting educational administrators. Schools generate vast amounts of data on student performance, teacher attendance, infrastructure status and more. AI-powered tools can help administrators analyse this data, uncover trends and make data-driven decisions to improve the educational environment. By analysing large datasets at the cluster, block, district and state levels, AI can help educational administrators streamline decision-making and allocate resources more effectively.

AI systems can help track data across districts, flagging areas where intervention is needed. These tools can also assist in ensuring that resources like textbooks, teaching staff and sanitation are adequately managed, thereby optimising school resources. The fact that AI can bring up data using just natural language chat can be a major factor in this. Predictive AI can help administrators plan, manage, and optimise school infrastructure and resources by analysing enrolment trends, facility usage, and other operational data. This ensures

that schools are well-equipped to meet student needs while minimising waste and inefficiencies.

AI's ability to process and analyse vast amounts of data could hold potential in improving educational outcomes. By providing administrators with actionable insights, AI can support more efficient policy decisions, ultimately leading to better educational experiences for students.

By providing administrators with actionable insights, AI can support more efficient policy decisions, ultimately leading to better educational experiences for students.

The way forward: Policy and implementation

AI in education brings both challenges and opportunities, making it essential for states to establish clear AI Implementation Guidelines for K-12 government schools. A well-defined policy can ensure AI strengthens the public school system rather than disrupting it.

The key immediate opportunity areas seem to be in terms of assisting teachers and in improving administrative processes as mentioned above.

One key principle must be avoiding the use of Predictive AI to forecast student outcomes, as it risks reinforcing biases and limiting opportunities. However, Predictive AI can still be valuable in administrative areas, such as resource allocation and identifying systemic trends, where it can improve efficiency without directly impacting individual student trajectories.

A successful AI strategy must be rooted in the local context, considering factors such as language diversity, infrastructure limitations, and teacher training needs. Policymakers should focus on practical applications, such as easing administrative workloads and improving data analysis, rather than expecting AI to revolutionise classroom teaching overnight. A phased approach, starting with teacher assistance and administrative support and gradually expanding AI's role in learning, will help ensure that technology enhances rather than replaces existing educational practices.

A successful AI strategy must be rooted in the local context, considering factors such as language diversity, infrastructure limitations, and teacher training needs. Policymakers should focus on practical applications, such as easing administrative workloads and improving data analysis, rather than expecting AI to revolutionise classroom teaching overnight.

To connect it back to the case with which we started, AI should be viewed as a support

tool for teachers and not a replacement. It can streamline administrative tasks, suggest interventions and offer supplementary resources. However, meaningful learning - like a child's trajectory in learning factorisation - depends on human connection, reasoning, and personalised interaction. No algorithm can replace the insight of a teacher, who understands a student's thought process and nurtures their "aha!" moments.

As we shape AI's role in education, the priority must be ensuring that technology enhances, not dictates, the learning experience. With a thoughtful, gradual approach, AI can empower educators, support students, and improve the efficiency of our education system, without losing sight of the human elements that make learning truly meaningful.

Endnotes

1 *COMPAS Algorithm,UK A-Level Results 2020*

References

Narayanan, A., & Kapoor, S. (2024). *AI Snake Oil: What Artificial Intelligence Can Do, What It Can't, and How to Tell the Difference.*

S Sreekanth is the founder of NLightN and has over 15 years of experience spanning programme management, leading teacher capacity building initiatives and developing AI-driven tools for education and skilling. He has worked with organisations like Wipro's CSR initiatives and the Azim Premji Foundation.
An alumnus of IIM Ahmedabad (MBA) and the College of Engineering, Thiruvananthapuram, Sreekanth has led teams in both startups and large corporations. His work in the Tech sector includes diverse roles in Iksula, an eCommerce solutions startup he co-founded, Tata Consultancy Services and eBay.