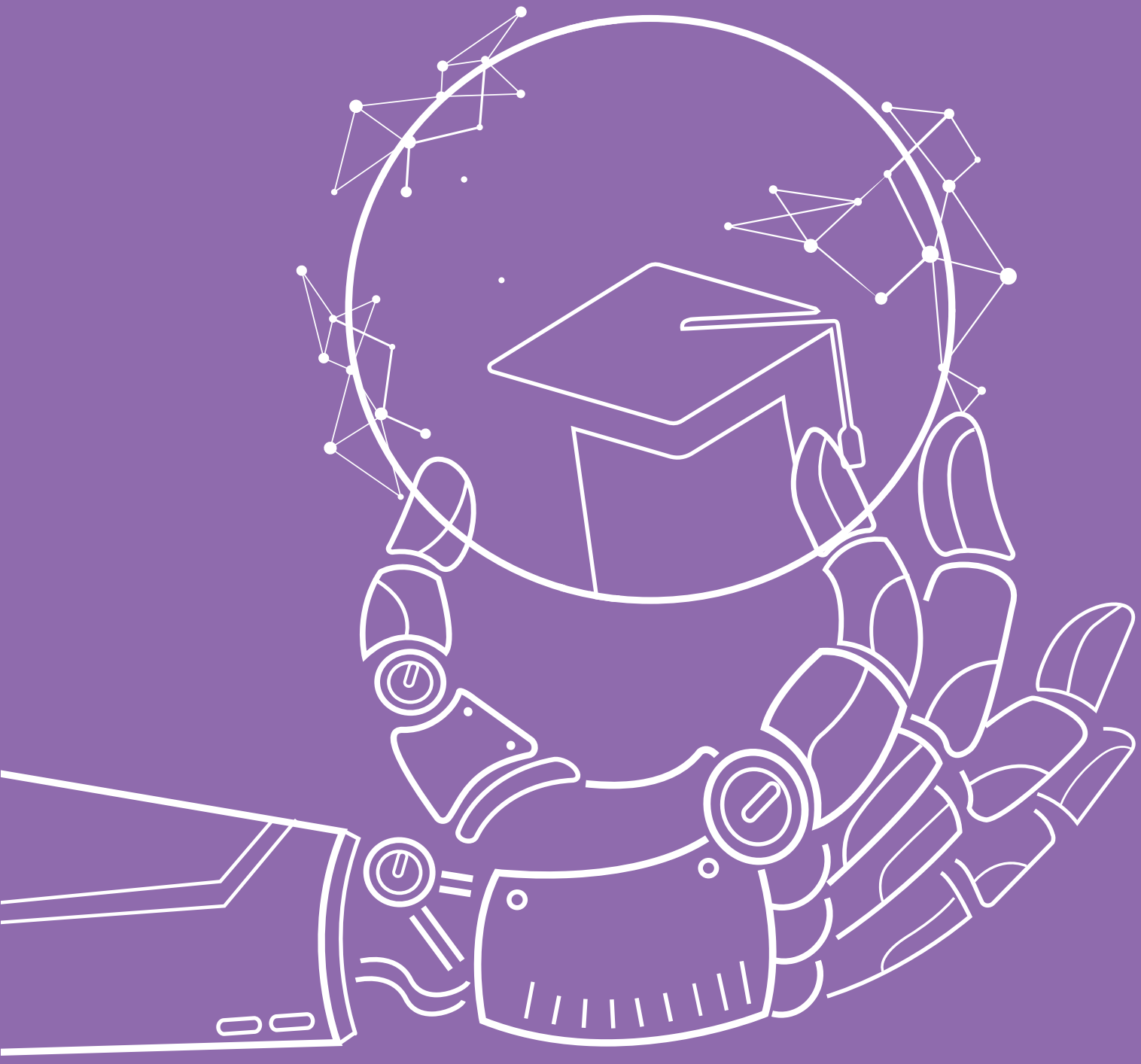
Artificial Intelligence in India - Vol. 10



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AI and Education in India

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TANDEM RESEARCH

Preface

"After all, we make ourselves according to the ideas we have of our possibilities."
V.S. Naipaul

There is no doubt that the technological advancement has become the game changer of our times. From the Industry 4.0 discourse launched in Germany in 2011 to the scientific advisory report presented to the former US president Barrack Obama on big data and privacy concerns in 2014, to India's NITI Aayog Artificial Intelligence for All strategy of 2018. A lot of debates have culminated in the questions about the Future of Work in the context of the International Labour Organisation's Centenary in 2019. Triggered by the disruptive forces of technology based start-ups and new business models, a new race for innovations and war for talents has arisen and with it, a new form of global and fierce competition.

Technology has become the holy grail of progress though it did not take long to realise that there is a social dimension attached to it. The platform economy has had severe effects on the bargaining power of suppliers and workers. Data analytics opened a whole array of ethical questions regarding personal tracking and privacy. Further, technological upgrades create productivity gains by efficiency which in turn requires reduced human labour. This poses a particular threat to emerging economies, like India, which need to create new jobs on massive scale for its young and growing population.

The utopia around Artificial Intelligence in the times of jobless growth presents a whole new set of challenges. Is the Indian economy ready to ride the AI wave? Who will benefit from AI: investors, big tech, users, or society as a whole? What is and can be India's role in this global race for innovation? Is tech gender neutral? What about privacy and user protection? How to ensure decent work and social protection in this new age tech revolution? But mostly, how can we turn AI FOR ALL into a reality?

To foster this debate, the FES India Office has teamed up with several experts and organisations across the country to explore ground realities with the objective to understand how technology is already unfolding in selected sectors, draft scenarios of what might happen and to ensure proper safeguards are put in place at the right time.

Artificial Intelligence like any other technology is neither good nor bad. It is what we make out of it - the rules and regulations – which define the outcome of the game. Just like other countries, in India too, a mass scale application of AI is far from being established. It is still in a nascent phase and can be moulded into a success story. A success story in India AND an Indian success story for all.

Patrick Ruether and Mandvi Kulshreshtha
April 2020
Friedrich-Ebert-Stiftung, New Delhi

Note of Thanks

Friedrich-Ebert-Stiftung India office is thankful to its partner Tandem Research for preparing this research paper. Tandem Research is an interdisciplinary research collective that generates policy insights at the interface of technology, society, and sustainability. FES India and Tandem Research have co-organised six policy labs to unpack AI applications in key sectors like sustainability, healthcare, education, agriculture and urbanity.

We are grateful to our colleagues at Tandem Research for preparing the research, drafting this paper and refining the manuscript to reflect our joint vision. We have to express our appreciation to all the experts and resources persons who participated in these labs, for their constructive contribution and valuable time during the course of this research.

Tandem Research's Technology Foresight Group (TFG) brings together multiple stakeholders to collectively and iteratively diagnose issues and challenges pertinent to technology and society futures in India. The present paper was developed at the AI Lab held in September 2019. The brief is based on discussions of the TFG but should not be seen as a consensus document — participant views differ and this document need not reflect the views of all participants.

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Contents

List of abbreviations

AI	Artificial Intelligence
AFRS	Automated facial recognition systems
ASER	Annual Status of Education Report
BITS	Birla Institute of Technology and Science
CGFSEL	Credit Guarantee Fund Scheme for Educational Loans
DIKSHA	Digital Infrastructure for Knowledge Sharing
EWS	Economically Weaker Section
ICTs	Information and Communication Technologies
ISB	Indian School of Business
MHRD	Ministry of Human Resource Development
ML	Machine Learning
MOOCs	Massive Open Online Courses
NITI Aayog	National Institution for Transforming India
PAAS	Platform as a service
PDP	Personal Data Protection bill
RTE	Right to Education Act
TCS	Tata Consultancy Services
U-DISE	Unified District Information System for Education
UIDAI	Unique Identification Authority of India
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNICEF	United Nations Children's Fund
US	United States of America
4IR	Fourth Industrial Revolution

1. Introduction

The education sector in India is a key site of intervention by the state, and a policy priority for both central and state governments. Yet, the education sector today remains a highly fragmented space—with wide disparities amongst various socio-economic groups in terms of access, differences in the quality between public and private education, as well as uneven outcomes between different Indian states.[1]

While the Economic Survey of India (2019-20) indicates a measure of improvements in the field of education with respect to access, infrastructure, and budget expenditure in the last decade—problems still persist within the system.[2] For instance, the recent Annual Status of Education Report (ASER, 2019) suggests that 40 per cent of first graders could not recognise letters and 59 per cent could not recognise two-digit numbers, with further imbalances in the learning outcomes of students from the public education sector as opposed to the private sector.[3] Even in the case of higher education, reports on employability levels of Indian graduates suggest that more than 80 per cent of graduates across different specialisations are considered unemployable.[4]

In India, there are currently around 500 million people in the age bracket of 5-24 years,[5] whose educational requirements demand extensive investments. A severe shortage of teachers, lack of access to quality education and poor infrastructure are only a few of the myriad problems facing the education sector in India today.[6] Rampant absenteeism and excessive administrative duties reduce the overall hours teachers spend teaching; it has been reported that government teachers spent less than 20 per cent of their annual school hours teaching and more than 80 per cent of their time is spent on non-teaching school-related activities.[7] Increasing privatisation of the education sector has led to a reduction in funds for public education and a rise in the general cost of education in India.[8] In 2019, private institutions accounted for 64 per cent of the total number of higher education institutions and 59 per cent of enrolment in the country, as compared to just 43 per cent and 33 per cent respectively a decade ago.[9] Concerns around the state of education are also compounded by the fact that new emerging technologies, under the umbrella of the so-called Fourth Industrial Revolution (4IR), are expected to create widespread changes to the future of work in India.[10]

In India, there are currently around 500 million people in the age bracket of 5-24 years, whose educational requirements demand extensive investments.

Technology, in particular digital technologies, have often been used as a tool to leapfrog over persistent challenges and service gaps in the education sector. This attempt to achieve better educational outcomes by leaping over basic problems through technology—specially to address the issues of scale and lack of infrastructure—is not a new phenomenon. The Indian State has been a key adopter of Information and Communication Technologies (ICTs) for education in the past. Under the National Mission on Education through ICTs, the government aims to create Virtual Labs, open source and access tools, virtual conference tools, talk to teacher programmes, and e-learning portals such as SAKSHAT, to widen the reach of education and achieve scale.[11]

The government's focus on the use of technologies is also reflected in the recommendations from the Draft National Education Policy (2019), which underscores the importance of digital technologies in improving classroom pedagogy, the continuous professional development of teachers, and improved access to education in remote areas and for disadvantaged groups.[12] In 2017, the government launched the Digital Infrastructure for Knowledge Sharing (DIKSHA) platform with the stated aim to equip all teachers across India with advanced digital technologies.[13] In the 'National Strategy for Artificial Intelligence in India' paper, National Institution for Transforming India (NITI Aayog, a policy Think Tank of Government of India) has highlighted education as one of the key areas for potential Artificial Intelligence (AI) applications in India.[14] The document envisions the use of AI in education to provide: personalised and adaptive learning tools for students, interactive learning platforms, predictive analytics for teacher allocation, as well as assessment of drop-out rates and resource management

in schools.[15]

Many of the emerging and existing AI applications within the education sector are being built on top of existing education technology (EdTech) infrastructure.[16] The EdTech industry has, in the past decade, also moved away from providing digital hardware and is instead building software products for education[17]—offering a range of services, from Massive Open Online Courses (MOOCs) and platformised collaboration channels to educational games and gamified learning materials.[18] While companies such as Chimple[19] focus on improving basic literacy skills, others such as Toppr[20] and Byju's provide online courses for competitive examinations for higher education. With increased investments, EdTech is also integrating AI into its services. For example; Educational Initiatives is promoting adaptive learning through a digital-self learning program.[21] Learning Matters is using Amazon Alexa to provide engaging learning opportunities in rural and semi-urban schools.[22] Toppr is using Machine Learning (ML) to assess students learning levels and provide personalised learning plans.[23]

The NITI Aayog paper frames AI within the education sector as a 'supplementary technology to pedagogy', and a tool to 'establish systems to inform and support decision-making across stakeholders and administrative levels'.[24] While AI has been framed as a supplementary technology, AI as a technology is not neutral and is likely to raise challenges and risks associated with its use. It is unlikely that AI will act as a silver bullet to address some of the core challenges of the sector. Previous changes to the sector, such as increasing privatisation and the rising costs of education have already created disparities in access and equity in education between those who can and those who cannot afford it. Thus, building AI on top of existing EdTech market infrastructure could further deepen the existing inequities already prevalent in the sector.

It is unlikely that AI will act as a silver bullet to address some of the core challenges in the education sector. Building AI on top of existing EdTech market infrastructure could further deepen the existing inequities already prevalent in the sector.

This paper examines existing and emerging use cases of AI in the education sector in India, with the aim of identifying key challenges and risks associated with these use cases. The paper is based on inputs from the AI for Education policy lab[25] as well as desk research. The next section discusses the different categories under which AI applications have been developed in relation to educational challenges in India. Following which, the paper examines the possible challenges and risks associated with the use of AI for education.

II. AI for education: use cases in India

Growing investments in the use of AI across different sectors, both in India and globally, has led to a number of AI applications for education. India has a growing EdTech market, which is expected to reach two billion US dollars by 2021. Currently, there are more than 3,500 EdTech startups in India with almost 700 million US dollars of funding being invested across 56 different companies.[26] The promise of AI within the education sector, is to provide personalised learning, development of skills and employability, as well as bringing in efficient and cost effective measure to a variety of administrative issues. As a field, AI is difficult to define, as its definitional and conceptual scope is constantly evolving. Some of the field's earliest founders broadly defined it in terms of human intelligence, arguing that AI-enabled devices 'could do any work a human can do'.[27] Currently, artificial intelligence encompasses a range of sub-fields and techniques, such as machine learning, deep learning, natural language programming, and computer vision.

The promise of AI within the education sector, is to provide personalised learning, development of skills and employability, as well as bringing in efficient and cost effective measure to a variety of administrative issues.

Historically, in India there has been a growing trend towards public-private partnerships in the sphere of education, with several government schools and colleges relying on private companies' products and services to roll-out ICTs and tech-based education schemes.[28] The development of AI and Education in India is therefore a space occupied by emerging technology start-ups and large companies. Personalised and adaptive learning software and career advisory platforms from companies such as Mindspark and Leverage Edu respectively, are being rolled out in various public and private schools in India. Several state governments have also partnered with large tech companies such as Microsoft and Dell, to pilot AI applications in government schools.

In India, use of AI for education can broadly be placed under the following categories of use cases:

- **Personalised and adaptive learning:** As a result of the rise in big data analytics and AI, it has been possible to introduce personalised and adaptive learning methods in the education sector. Personalised adaptive learning encompasses the use of machine learning to assess a student's abilities and curate educational material according to individual needs, factoring in variables such as; pace of learning and the pedagogical method required.[29]

  In India, examples of personalised and adaptive learning providers include tech start-ups such as Jungroo Learning and Mindspark. Jungroo Learning, is a 'platform as a service' (PAAS) company which uses machine learning to predict both a student's current level of knowledge and, subsequently, the 'shortest possible path of learning a subject/topic for that particular student'.[30] Jungroo Learning has partnered with non-profit organisations, such as Teach for India and Bhumi, to roll out their adaptive learning and assessments platforms in partner schools in India.[31] Similarly, Mindspark, an adaptive online tutoring system, uses AI for personalised and adaptive learning in classrooms. It complements classroom instruction by generating insights for teachers about their students' particular strengths and weaknesses.[32] Mindspark has been rolled out in more than 178 schools, both public and private, in India, and is also available in at least two languages other than English.[33]

- **Career advisory platforms:** Using data analytics and machine learning algorithms to generate user profiles, career advisory platforms match users to relevant databases within industry and job markets, in order to inform career choices. While there are several online career counselling and guidance platforms, some have begun to bundle AI-based tools into their services.

  In India, examples of career advisory platforms using AI include companies such as LeverageEdu and Krackin. LeverageEdu is a mentorship and career advisory 'AI enabled marketplace', with more than

one million monthly active users.[34] Leverage Edu, uses an AI algorithm to match students to different colleges and programmes based on their profile, as well as to virtual mentors in the relevant sector. Krackin is a student employability and engagement platform which matches students with skills for the job they want.[35]

- **Intelligent tutoring systems:** Intelligent tutoring systems refer to computer-supported learning environments that are based on AI.[36] These systems rely on AI to deliver customised content to students and provide them with immediate feedback, reducing the direct burden on teachers.

  In some cases, chatbots and robots are being used to answer student queries and deliver lessons in the classroom to reduce the workload burden on teachers.[37] Applications also extend to the use of AI systems for setting exams and grading student papers, which may be included as part of a bundle of services with personalised and adaptive learning resources. AI is also being used for predicting school drop-out rates.

  In India, companies such as Splashgain Technologies provide 'remote proctoring solutions', which enables teachers to invigilate without being physically present in the classroom and allow students to take tests from anywhere. Universities are rapidly adopting these technologies. The Tamil Nadu Dr. MGR Medical University is using AI to monitor examination halls and check for malpractice. Similarly, Tata Consultancy Services (TCS) have created an AI system with the ability to track 6,000 examination venues and surveil them for potential examination cheating.

- **Education loans and credit platforms:** Education loan and credit platforms use AI algorithms to provide streamlined education loans to students, based on factors such as future earning potential, market trends and family history, amongst others.

  For example, in India, Credenc is an AI-based fintech company which offers education loans to students based on alternate credit scores. AI-based credit scoring to provide education and business loans, to graduates and students make up a growing trend of fintech companies in India who use alternative credit scoring methods to underwrite loans and assess eligibility.

  Apart from augmenting learning, the use of various AI applications, be it through the introduction of personalised and adaptive learning software in classrooms, or intelligent tutoring is also expected to reduce teacher burden. Additionally, some AI for Good applications within the education space in India cater to populations without means of access and infrastructure. The Kolibri Initiative developed by Learning Equality uses ML to support educational content relevant for areas which lack internet connectivity. As most ML models are driven by data collected from individuals with access to the internet (which stands at around 59per cent of the global population),[38] the learning solutions informed by that data and the subsequent learning pathways created will be tailored to their needs. The Kolibri initiative focuses on populations in places with limited or no internet connectivity and uses heuristics to make predictions based on data from local servers which are disconnected and offline. This helps inform the platform with data that belongs to the communities it is operating in, allowing it to tailor content to students' needs. The offline data is then synchronised to a larger comprehensive data set, making it more inclusive by incorporating data from those without internet access. This helps make the products more inclusive by providing them with diverse datasets that also represent unconnected populations. [39]

Further, while private EdTech companies seem to be driving the majority of AI application and use cases in India, many state governments have also launched initiatives and programmes focusing on integrating AI in education. The state of Haryana's Department of School Education, which has been using AI extensively, is a prime example. The department's adaptive learning system helps provide students with content suited to their learning levels and also informs teachers about any issues students face in comprehending content. Additionally, an automated grader, upon receiving samples of satisfactory and unsatisfactory essays, is able to grade essays. This helps to reduce teachers' workload and helps students

reflect on their work soon after they submit it by providing instant feedback. Additionally, chatbots collect the students' opinions by providing them with multiple options through a dialogue interface. Student responses are then analysed to gauge overall perception. Ultimately, AI is also leveraged to break the content of textbooks into small packages of study guides which are simple, easy to access, and easy to understand. These guides incorporate learning aids such as flash cards, multiple-choice questions, fill-in-the-blank questions, true or false questions, pointers and summaries. AI-based assistants are being used to respond to queries made by students and aid teachers in remote training programmes.[40]

State governments are also partnering with private companies to tackle challenges in the educational sector. The government of Andhra Pradesh collaborated with Microsoft to use machine learning to analyse dropout rates.[41] By using data already available from the school (such as the gender, socio-economic status and learning levels of pupils and the infrastructure of the school), the machine learning process was able to identify 19,500 students who were likely to drop out. The government proceeded to conduct programmes and counselling sessions for these particular students, and their parents, who were flagged by the process. Insufficient furniture and inadequate toilets were identified as factors that nudge students to drop out.

Similarly, Dell has partnered up with state governments to roll out AI interventions in the education sphere. Dell, through 'Dell Aarambh,' in partnership with FramerSpace, is providing ICT training to teachers in Karnataka, Maharashtra, and Andhra Pradesh. While Dell Aarambh helps familiarise teachers with computers, FramerSpace helps them create and implement learning plans and monitor their students' progress. The engagement has been spread over three phases and will be implemented in other states pursuant to an impact assessment in the third phase.[42]

Apart from the involvement of the private sector in the development of AI for education, there are also private-public partnerships to introduce AI courses for training and skilling, in the education sector. In India, Microsoft has partnered with ten higher education institutions, such as BITS and ISB to provide infrastructure, curriculum and content support for AI, access to cloud and AI services as well as developer support.[43] Several centres of excellence to promote AI research and development in India have also been launched, relying on public-private partnerships between governments, academia, industry bodies and technology companies.[44]

III. Challenges and risks

Undoubtedly, an effective education sector is needed to strengthen and improve productivity, economic development and subsequent societal well-being. Through the use of AI, the government aims to improve pedagogical processes, enabling teachers to provide better feedback to students, gauge students' attention levels for remedial instructions, predict dropout rates, teacher postings, customised professional learning and development of students.[45] The government claims that these applications will not only support individual students and teachers to further benefit from educational opportunities, but will also bolster socio-economic development on a national level, and help to ensure the Indian labour markets readiness for the future.[46] However, the use of AI in education poses several societal challenges and risks. Concerns around the impact of AI in education range from: loss of privacy and the normalisation of surveillance in schools and educational institutions to entrenching older forms of inequity while creating new ones. While on one hand, teachers worry about job loss due to the automation of teaching, educationists and civil society are apprehensive about the risk of the oversimplification of pedagogy and the narrowing of education goals.

While on one hand, teachers worry about job loss due to the automation of teaching, educationists and civil society are apprehensive about the risk of the oversimplification of pedagogy and the narrowing of education goals.

Further, uncritical acceptance of technologies as a transformational tool for challenges in the education sector runs the risk of disportionate or ill-fitted solutioning. Reflections on previous ICT use in education, shows that often technologies such as ICTs are tacked on to the curriculum or classroom practices without proper attention to the contextual needs and challenges of a specific school or programme.[47] As Zawacki-Richter et. al. have pointed out, there is a need to understand that 'educational technology is not (only) about technology-it is the pedagogical, ethical, social, cultural and economic dimensions of AIEd we should be concerned about."[48] For instance, while the use of AI in education could provide personalised education tools and help predict student engagement levels, the same technologies can also be used for surveillance of students and teachers and lead to the devolution of trust between teachers and students within the education system.[49]

Uncritical acceptance of technologies as a transformational tool for challenges in the education sector runs the risk of disportionate or ill-fitted solutioning.

The risks and challenges associated with the use of AI in education have to be seen within the broader context of the aim and purpose of education in society. In India, the challenges to the use of AI in education constitute several roadblocks to the effective and useful application of 'AI for All'—lack of basic infrastructure and low-levels of digital literacy being the most prominent of them. Similarly, the risks associated with AI use span across a range of ethical and social conundrums, such as infringements to privacy, the concentration of knowledge and power in the hands of tech companies, as well as the impact on work, mobility and digital labour.

Narrowing education goals

One of the primary use cases of AI in the education sector has been towards the improvement of learning outcomes, be that through the use of personalised and adaptive learning, intelligent tutoring systems or any other method. However, the current paradigm of assessing education through the measurement of learning outcomes itself needs to be challenged. Burch and Miglani note that techniques to measure quality of education and learning outcomes through quantitative metrics have come to be seen as a central component to improve societal outcomes for underserved children today.[50] At the same time, this movement has been accompanied by the simultaneous development of EdTech tools and digital learning methods, which not only quantify learning outcomes, but also claim to provide solutions to improve them.[51] The growing consensus around the need to calculate, measure and then quantitatively improve learning creates a hegemony situated at the confluence

of technology, private capital and state power. The effect of such a hegemony is two-pronged as: firstly, it immediately legitimises any technology that claims to improve learning outcomes and secondly, the centrality of data and quantifiable information as a way to gauge learning outcomes, implies that immeasurable factors that cannot be captured move to the background.[52] This implies that certain forms of information or types of knowledge become more valuable than others.

Referring back to the example of the Andhra Pradesh government using AI technology to predict school dropout rates - in order to build the system, the Andhra Pradesh government tapped into three databases- the Unified District Information System for Education (U-DISE), educational assessment data that was taken from various sources, and socio-economic information from the UIDAI-Aadhaar system, which were then used in Microsoft's AI system.[53] This method signals a number of potential risks: the interlinking of databases raises concerns over data privacy, and the resulting outputs also involve the extrapolation of data insights and surveillance of teachers. As in this case the same data could also be used to infer teachers' effectiveness.[54] While the algorithm provides information on which students are likely to dropout, there is little clarity on the outcomes of the proposed interventions for the students.

Data on school dropouts show that most students who drop out of schools, often come from poor or marginalised sections of society.[55] Children who attend school inconsistently often drop out due to several reasons: access, poverty, distance, farm work, being some of the pertinent factors.[56] Effectively countering school drop-out rates will require coordinated efforts from state government departments and grassroot organisations to implement flexible pedagogical plans for working children's education. Learning modules and interventions such as the *Nali Kali*[57] programme or the School in a Box[58] module in Andhra Pradesh, are designed specifically to service rural communities, where technological infrastructure continues to be poor and job opportunities are low. Allowing students from marginalised and rural communities to learn at their own pace, through an innovative curriculum design and situated learning practices, is a good example of a non-AI based holistic education programme to improve student retention.

Further, as market driven AI-based EdTech solutions increase in scope, several AI applications are being offered which provide career advisory and mentorship services to students and match students with future skills and jobs. These run the risk of framing education goals, entirely by market or product driven logic - which would require specific skills or profiles and discard others. While oriented to the future of work and the requisite skills needed for the creation of an employable workforce, the goal of education pertains to much more than skilling and enabling workforce participation. Traditional approaches to education like the whole-child approach, approach education from a holistic perspective. The holistic perspective focuses on a host of factors such as health, emotional and spiritual development aiming for overall development and wellbeing of the child. AI-based EdTech solutions are primarily centered around products, and to a large extent, rely heavily on quantitative indicators to measure success. It also raises the question of affordability of education; while private schools and educational institutions are able to fund and use AI for education, the scenario in public schools and institutions is quite the opposite. According to the ASER report, only 21.3 per cent of students had access to computers, in public schools in India.[59]

Several AI applications provide career advisory and mentorship to students and match students with future skills and jobs. These run the risk of framing education goals, entirely by market or product driven logic - which would require specific skills or profiles and discard others.

Inherent bias and lack of transparency

In the context of AI, algorithms have an enormous influence in determining an individual's life chances, especially in the context of education and economic opportunities. Inequalities and existing social biases entrenched in the extant data used to train algorithms are shown to often creep into the functioning of the AI model. Several examples of biased algorithms have already emerged despite the relative infancy of certain AI models – from facial recognition algorithms being unable to distinguish between Asian faces as compared to

Caucasian faces, to the use of systems such as COMPAS—a risk assessment algorithm which predicts crime hot spots in the United States of America— which is biased against racial minorities.[60] Similarly historical practices of discrimination and societal biases can also creep into datasets used for training algorithms in AI development for education.

The use of algorithmic decision-making to underwrite education loans will not necessarily be a fair or unbiased arbiter, as the same parameters such as gender, social class, economic background and caste, could potentially be used to score the future earning potential of students applying for loans.

Consider this example from India—MHRD data from last year (2019) shows that only 10 per cent of education loans in the country went to students categorised as scheduled castes (SC) and scheduled tribes (ST), while more than 70 per cent of loans were disbursed to general category students under the Credit Guarantee Fund Scheme for Educational Loans (CGFSEL).[61] A number of factors could have played a role in this, such as: lack of access stemming from class disparities, to entrenched societal bias affecting the decision making of the loaning officer. The use of algorithmic decision-making to underwrite education loans will not necessarily be a fair or unbiased arbiter, as the same parameters such as gender, social class, economic background and caste, could potentially be used to score the future earning potential of students applying for loans.

Statistical biases in data in the form of unrepresentative data or data gaps, often reflect historical or societal biases. Further, there are no agreed upon definitions of what fairness means in the case of AI models. The question of bias and fairness in AI algorithms must then be framed in terms of how to reflect human values, rather than in terms of efficiency and mathematical correctness.[62]

To further compound the risk, AI algorithms being used to assess learning levels, and future earning potential are often opaque and lack transparency as they are treated as trade secrets and proprietary. The organisational and societal configurations around these algorithms, often work to maintain the opacity of the algorithm.[63] In light of debates around algorithmic bias and opacity, several suggestions such as algorithmic audits and ensuring explainability have been suggested.[64] Algorithmic audits are mechanisms to check the engineering processes in AI development and deployment—whether they meet ethical standards and are in tandem with organisational principles. Explainability refers to the generation of explanations for algorithms used in AI systems. While algorithmic audits and explainability are in principle useful measures to check an algorithms impact, most ethical frameworks are considered inactionable,[65] and there is no clear understanding of harm, as they differ from situation to situation. Thus, the question becomes: auditing for what? Or explanations for whom? In the case of algorithmic auditing, there are no agreed upon ethical standards and organisational principles also vary from company to company. Even when the algorithm has been potentially audited for ethics and societal harm, there will be limits to what extent it can be done. Both algorithmic audits and explanability suggest what are essentially technological solutions. As Annany and Crawford state, there are serious limitations to technological creation of transparency, as long the social and organisational principles around the use of AI remain unchanged.[66]

Privacy frameworks unfit for purpose

The current Personal Data Protection (PDP) bill in India has several ramifications for the protection of data collected by schools and other educational institutes,[67] with the relationship between schools and student recast under the role of data fiduciaries and data principals. This would imply that several of the current data practices of schools, such as admissions, examinations and day-to-day school functioning would have to undergo changes, as schools collect several levels of data of students—from personal information such as names and health data, to academic performance records.

While the Personal Data Protection Bill places several responsibilities on schools as data fiduciaries, in the absence of administrative oversight, such provisions may go unenforced.

However, given the social and cultural context of schooling in India, the application of data protection in schools can prove to be mired in complexities. Analysis

of notice and consent frameworks for privacy, has been consistently proven to be ineffective mechanisms[68] and in the context of AI use is rendered useless, as the data ecosystems for AI are harder to understand and opaque.[69] Not only are students and teachers, as well administrative staff, in relationships of vast power imbalances, many schools in India also have a record of flagrantly disavowing laws and state directives in favour of social norms and prejudices. For instance, schools and universities in India, have been repeatedly called out as sites of caste and gender discrimination.[70] Even in cities and urban areas, private schools do not follow the provisions placed under the Right To Education Act (RTE), to admit 25 per cent of students from Economically Weaker Section (EWS) category.[71] While the PDP places several responsibilities on schools as data fiduciaries, in the absence of administrative oversight, such provisions may go unenforced.

Further, while students as data principles will be given the right to ask schools to erase their data when it is no longer necessary for the purpose it was created, the PDP bill also gives the final authority on decision-making regarding children's data to the school. This gives schools the right to refuse to erase pupils' data. In such scenarios, separate considerations need to be put into place when handling children's data and rigorous audit mechanisms and robust technological infrastructures are essential.

The issue of child rights under new regimes of market and technological change need thorough considerations prior to implementation.

While the provision of 'privacy by design' is relevant in the case of children's data collected by schools, the use AI in education and the subsequent collection of children's data also has to be viewed from the lens of child rights. Children may not be aware of what they consenting to, or the long-term ramifications of their consent. According to a UNICEF report, "Always-on surveillance practices that continuously monitor everything from children's engagement in the classroom to their emotional states throughout the day threaten the creativity, freedom of choice and self-determination of children by potentially fostering an overabundance of self-censorship and social control. Once automated surveillance technologies are deployed at schools and in classrooms, children's rights such as the right to privacy, the right not to be subjected to discrimination, the right to flourish, and freedom of expression may be compromised due to the panopticon environment in which children are confined".[72] The issue of child rights under new regimes of market and technological change need thorough considerations prior to implementation. While organisations such as UNICEF have begun thinking about the wider implications of AI for child rights, policy discourse in India would need to engage in the specific issues related to child rights, data privacy and impact of AI technology within the context.

Through methods such as remote proctoring, platformised learning, classrooms and institutions are changing from physical environments to increasingly datafied networks or datascapes.

Datafication of education and social sorting

Along with concerns around the use of children's data, there is also the unease over the increasing significance and centrality of data for numerous processes and practises related to education and its impact. Data is being used to track student's activities, assess teachers, assign career pathways and for the provision of loans to access education. In India, apart from AI applications being rolled out in classrooms, other methods of data collection are increasingly being adopted. Smart ID cards, which are parts of smart attendance systems, are one prevalent form of datafication in India. According to the report, the students not only mark their attendance but gain access to restricted areas and pay for canteen meals with a multi-purpose smart card.[73] Through methods such as remote proctoring, platformised learning, classrooms and institutions are changing from physical environments to increasingly datafied networks or datascapes.[74] Research around the use of extensive integration of AI-based monitoring and tracking systems have also indicated the changing nature of students and teachers relationships, as a response to the latter's ability to provide safe and secure environments for students as control lies with neither over these data networks.[75]

Scholars argue that new modes of data-driven rationalities drive what we see as important and worthy of our time and data becomes central to shaping behaviours and belief.

The intensification of data driven processes in all spheres of life and the increased significance of data in such a way as to influence the practices, values and subjectivities in a setting has been termed as datafication.[76] Scholars argue that new modes of data-driven rationalities drive what we see as important and worthy of our time and data becomes central to shaping behaviours and belief. It is also argued that new modes of quantitatively assessing students' learning levels and performance metrics prioritise the provision of evidence and account-giving as proof of learning.[77] In places where AI-based data driven learning has already become entrenched, it has been noted that "the teacher becomes less a transmitter of information but a data producer and analyst who enrols the child as the same – as a social scientist of their own learning ability, achievements and life trajectory."[78]

The underlying assumption in all AI-based education solutions is that increased granularity and multiplicity of data points will lead to better outcomes, as algorithms are able to tell the 'actual truth' about a child's progress (or lack thereof), which may have escaped human judgement. It is argued that personalised and adaptive learning for example, will enable students to reduce their failure rates by consulting algorithmic heatmaps which correlate higher chances of failure with factors such as a longer commute.[79] However, even if greater visibility can offer greater insight and rewire learning, often such kinds of visibility creates the opposite effect. AI-driven forms of visibility can lead to states of hypervisibility, resulting in overexposure and lack of control over how one is perceived.[80] Personalised and adaptive learning tools that track and monitor every interaction a student may have with the platform risk the creation of states of hypervisibility, leading to a loss of control and the right to the presentation of the self. [81]

Market driven products which aim to carry out match-making between students jobs and future careers within the education sector, can lead to an overdetermination of children's abilities and life choices.

Further, the development of AI demands data and more granular the data, the more efficient the model. The collection and processing of children's data for the development and use of AI, also creates the risk of socially sorting and categorising students at an early age. For instance, AI applications designed to create a hypervisibe and granular profile of a child's learning capabilities or future potential, might be used to construe the child as fit for certain careers or subjects, and unfit for others. Platforms such as Credenc,[82] an AI-based student loan writing company, claims to use as many as 15 million data points to underwrite student loans, which implies the creation of extensive profiles and an almost 360 degree view of students.[83] Additionally, such market driven products which aim to carry out match-making between students jobs and future careers within the education sector, can lead to an overdetermination of children's abilities and life choices.

Adding to the discourse around the hypervisibilised child, increasingly, schools and educational institutions are also becoming sites of mass surveillance. Automated facial recognition systems (AFRS) are being employed extensively in both private and public schools. The use of AFRS in schools as casual efficiency improving mechanisms and security measures, can risk normalising surveillance as an everyday experience. In Delhi, for instance, CCTV cameras have been installed across schools. Live feeds of these cameras are accessible by the parents of students studying in the schools. While there is a limitation which allows parents to only access the feed for 15 minutes at a stretch up to three times a day, it nonetheless creates the feeling of being watched and surveilled. Petitions have been filed to argue that the classroom is a semi-private space, outside the public sphere, where children should be allowed to be themselves and develop, without the fear of always being watched.[84] Additionally, there is no clarity if the data of students being captured with explicit parental consent, and whether appropriate data storage and handling methods are being employed.[85]

In a datafied society, there is the possibility of increasing commodification of children's data as AI based EdTech services emerge as a lucrative market. While at the same time, there arises also the possibility of relegating those factors such as children's desires, and wants, not easily captured by data outside the scope of educational aims. In the case of personalised and adaptive learning algorithms, how students interact on a platform will be based on several factors and not necessarily related to cognitive skills or learning levels and may have to do with

a child's environmental factors, nutritional levels. A datafied assessment system, bases its evaluation on only those factors that can be objectively captured from the interaction itself. One of the possible outcomes of the datafication of education is that wider education objectives—such as enabling critical thinking, social and emotional learning and the ability to learn itself—become aligned or be neglected for enabling practices for data collection.

IV. Conclusion

Future policy on the use of AI in education in India needs to be informed by both longitudinal research to assess the impacts of AI use in India, as well as in-depth case studies, highlighting teachers and students and workers' experience of AI use in education. Uncritical adoption of AI technologies would further entrench existing inequities arising from the unfair distribution of technological gains. While AI based EdTech platforms have made several claims regarding the efficacy of their technology, studies have shown that this is not always the case. For instance, the development of new classroom surveillance tools using facial and emotion recognition are seen to rest on scientifically unfounded claims.[86] Similarly, reports have also countered claims of increased learning outcomes on the basis of AI-based adaptive learning techniques.[87] Studies on AI-based facial and emotion recognition softwares for schools raises the question of whether such AI-based products are being developed because no other methods suffice, or whether these systems are in place simply because of the 'ability' of current AI applications to read faces and gauge affect exists. Scholars point to the dangers in creating societal and educational infrastructures which while they may suit and enable data analytics but will not serve people.[88] Greater scientific scrutiny and ethical considerations need to be placed before AI applications promising magical solutions are deployed and used in the context of schools and educational institutions.

Scholars point to the dangers in creating societal and educational infrastructures which while they may suit and enable data analytics but will not serve people.

Growing investments in the development and use of AI in education, calls for further research into its actual use, development and deployment on the ground in India's schools and higher education institutions. While AI is being framed as a way to leapfrog over persistent challenges in the education sector in India, such as access and teacher burden, there is need to address foundational challenges such as the lack of infrastructure—both physical and digital—before any technological solution can work effectively. In an already resource scarce public education system—where due consideration needs to be placed on the best possible allocation of resources—research in contributing factors such as; teacher absenteeism, school drop-outs or low-attention span need to be taken into account and funds allocated towards their solutions. The favourable disposition of different Indian states, towards technological solutionism using AI for education, could also create a tradeoff between access and quality. This could lead to a situation where quality education using augmented or blended forms of learning using both technological as well as human resources are available for a minority of those who can afford it, and striped down or impoverished versions of these arrangements are rolled out for the majority - and widen existing disparities.

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Further, most machine learning algorithms are generators of statistical correlations, that is, they can identify and cross match patterns, for instance gender and school dropouts are correlated to each other. However, such prediction and analysis algorithms do not establish causality. Over-reliance on AI-based predictions and the presumed objectivity of algorithms will not enable us to solve the challenges of the education sector in India. While AI can be useful for surface covariates,[89] and bring out correlations and patterns in data, to index a problem, greater research needs to channeled into already existing best practices and ways to scale these within the education sector. Exposure to AI-based tools and development of computer-based digital skills are necessary for an equipped workforce, and employability in both current and future scenario of work in India. However, it is also necessary that AI tools being developed within education, fit the need and the context of the problem, and do not indiscriminately apply an AI solution to a non-AI problem.

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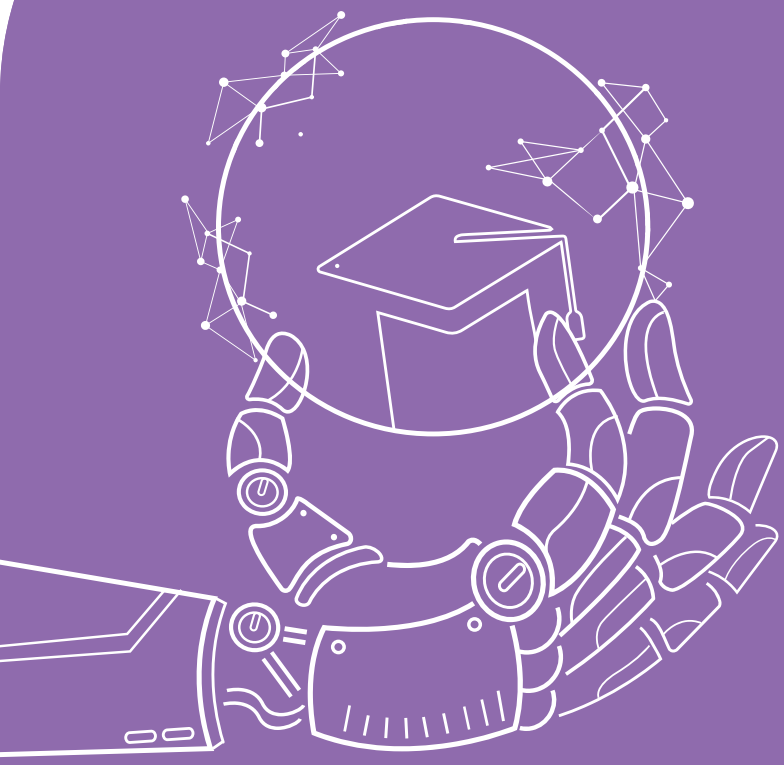

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