Harnessing AI for Educational Transformation: A Comparative Study of China, India and Pakistan

Rubia Shoukat*

Abstract

Artificial intelligence (AI) is transforming education globally, enhancing learning experiences and outcomes through personalised learning, automated grading and smart content. This paper provides a comparative analysis of the extent to which AI technology is implemented in the educational systems of China and India, highlighting key initiatives, successes and challenges. Based on these findings, recommendations are made for Pakistan to adopt similar strategies to enhance its educational landscape. The study determined that AI has been extensively adopted and utilised in education by various educational institutions in multiple forms. Initially, AI manifested through computers and related technologies, evolving into web-based and online intelligent education systems. Eventually, the integration of embedded computer systems and other technologies led to the use of humanoid robots and web-based chatbots to perform instructors' duties, either independently or alongside human instructors. Additionally, these systems leverage machine learning and adaptability to customise and personalise curriculum and content to meet students' needs, which has enhanced student engagement and retention, thereby improving the overall learning experience and quality of education.

Keywords: Ed Tech, Artificial Intelligence, AI, Education, Machine Learning, Man-Machine Interface

Introduction

The concept of social change is multifaceted and has multiple definitions. The term is used to describe how interpersonal relationships, interactions

* *The author is a faculty member, Department of International Relations, Iqra University, Karachi. Email: rubiashoukat.edu@gmail.com*

with others, cognitive abilities and values change during the course of time.[1] These changes eventually alter social and cultural structures, ideas and regulations which have a profound long-term effect on society. Social change is not always evident right away, it often requires years to realise.

Artificial intelligence (AI) is the result of the merger of information communication technology, computers, machines and computer-related technologies. It allows computers to execute tasks that are almost identical to those of humans. The education sector has made substantial use of AI in parallel with the development and application of new technology[2].

It is a powerful force for societal transformation, not merely a new development in technological domain. AI is changing many aspects of our society, including industries, education, daily life, scientific research, and social connections. Adoption is necessary to ensure sustainable development, promote diversity, address difficult issues, improve worker skills and maintain economic competitiveness. AI has the ability to advance society and raise standards of living. As AI develops, its potential to enhance and impact life increases. As a result, civilisations must adopt and responsibly incorporate AI technology in order to promote a more just and prosperous future.

AI has completely transformed a number of industries with education being one of the most notable. Globally, educational organisations are using AI technologies to incorporate into their daily activities to support individualised learning, boost administrative effectiveness and offer creative answers to long-standing problems. China and India are two of the nations, which are embracing AI technology in education the most, having made significant investments and advancements in this field.

Social change are closely related with AI since it has the ability to significantly alter many facets of society. AI is automating a lot of tasks in the workplace, which is changing the labor market by replacing regular occupations with new opportunities in data science and AI development. AI has the potential to increase economic development and productivity by streamlining operations, automation and cutting costs. But if benefits

[1] L. Chen, P. Chen and Z. Lin, "Artificial Intelligence in Education: A Review," in IEEE Access, vol. 8 (2020): 75264-75278, doi: 10.1109/ACCESS.2020.2988510.
[2] Chen, Chen and Lin, "Artificial Intelligence in Education."

are not distributed fairly, it might also worsen inequality, creating opportunities for some and lack of opportunities for others. AI developments in healthcare enhance patient care and diagnostic accuracy, but they also present ethical and data security issues. AI technologies, such as virtual assistants and social media algorithms, are also changing social interactions. While these tools help people communicate, they also create privacy and disinformation concerns.

AI is changing laws and regulations through data-driven decision-making and increased administrative effectiveness; yet, new rules are required to address bias in algorithms that may occur. Because AI poses ethical concerns related to bias, transparency, and human rights, it is imperative that societal values be taken into consideration as it develops. AI's pervasiveness in daily life is reflected in changes that are altering culture and lifestyle, while its use in cyber operations and surveillance has an impact on political and security dynamics and raises questions regarding civil liberties and personal lives. AI continues to transform education through increasing access to educational resources, optimising individualised learning and streamlining administrative processes. AI adapts instructional information to each student's needs using adaptive learning systems, enabling individualised training that can accommodate varying learning styles according to the individual's pace and capacity to understnad.

Intelligent teaching programs help students stay interested and comprehend difficult ideas by offering real-time feedback and guidance. AI also frees up teachers to concentrate more on instruction and student interaction by automating administrative duties like scheduling and grading. These datasets may be analysed by AI-powered tools to find patterns and deficiencies in education, which can help with policy and developing curricula. AI helps close educational gaps, especially in underprivileged regions, by enabling distant learning and granting access to a multitude of digital resources. This fosters a more open and equitable learning environment for everyone.

The purpose of this research is to compare the use of AI in China's and India's educational systems and how essential it is to adopt this cutting-edge technology to compete in the international market. This study aims to explore perspectives and methodology by looking at the approaches, tools

and results of these two countries and why this technology is essential for the country for its development. Pakistan, a nation aiming to improve its educational system and results, might gain by grasping and possibly implementing AI-driven innovations in education.

Theoretical Framework

In this study, Veblen's theory of social change is used. It is discovered that while some gaps in the theory need to be filled, the theory fits in well with the above argument. In essence, the theory is a technical account of history. Theorists held that a society's culture is shaped by the technology that is available to it. The theorist states that the Institutions are products of the past process, are adapted to past circumstances, and are therefore never in full accordance with the requirements of the present, rather, it challenges old institutions and evokes their resistance.[3] According to Veblen, a new technology distorts established beliefs, triumphs over existing interests and reshapes institutions to suit its own requirements. However, this process might take quite some time. For instance, by 2025, AI is predicted by the World Economic Forum's "The Future of Jobs Report 2020" to replace 85 million jobs globally. The research continues, despite the frightening sound, by predicting that within that same period, 97 million new jobs will be created.[4]

Social disputes are likely to be more prominent during times of transition between the old order and the one that is about to be established. Unlike Marx, Veblen did not believe that the class struggle was the driving force behind history. The conflict he perceived as driving history was that of developing technology against regressive institutions.

[3] Rick Tilman, "Some Recent Interpretations of Thorstein Veblen's Theory of Institutional Change," *Journal of Economic Issues* 21, no. 2 (1987): 683-90, http://www.jstor.org/stable/4225880

[4] Matthew Urwin, "AI Taking over Jobs: What to Know about the Future of Jobs," *Built In*, September 12, 2023, https://builtin.com/artificial-intelligence/ai-replacing-jobs-creating-jobs.

Technological Determinism

Veblen thought that the main force behind societal development is technological progress. This theory holds that technological development modifies the means of production which modifies social and economic interactions. The production and distribution of goods and services are altered, new sectors are created and labour requirements are changed by new technologies. Laws, practices and organisational structures are examples of social institutions that must adapt in response to these changes.

Institutional Adaptation and Lag

Even while technology is changing quickly, social systems are typically less adaptable. Veblen contended that social institutions frequently take longer to adapt to technological improvements. As society tries to adapt its long-standing conventions and practices to the new technological realities, this lag causes a time of conflict and stress. For instance, the development of industrial technology necessitated profound adjustments to family structures, educational programs and labor rules similar is with AI.

Conflict between Technology and Institutions

Veblen observed a persistent conflict between the comparatively static nature of institutions and the dynamic character of technical progress. He proposed that friction arises as technology advances and upends established social orders. Institutions may need to change as a result of this disagreement and potential for societal unrest. As, AI is considered as a threat to human, and it is considered that AI will take over jobs which will eliminate the need of human labour.

Cumulative Causation

Veblen developed the theory of cumulative causation to explain how social change happens. Technological developments initiate a series of actions that result in additional modifications. Over time, there may be major changes in social structures as a result of the cumulative effect that

each discovery has on earlier breakthroughs. This theory suggests that modest advancements in technology have the potential to compound into significant societal shifts.

Veblen's idea is exemplified by AI. Production techniques were significantly changed by technological advancements like mechanised manufacturing and the steam engine. Due to the upheaval of preexisting social structures, there were notable changes in labour and economic practices, the emergence of new social classes and urbanisation. Social pressures and disputes brought about by the institutional slowness of adaptation finally resulted in changes to the education, social welfare and labour laws.

Similarly, AI is one technological innovation that is having a drastic effect on our societies. This is increasing on an exponential level creating Moore's Law effect and causing a divide among tech and non-tech people of the society and of the world.

It may be argued that Veblen's idea of social change and technical progress is the most similar to the author's vision of AI in education and its impact on society and on Edtech. Although this idea contradicts some of the ongoing consequences of AI, it conveys the concept adequately. The paradigm emphasises the critical role of technology in fostering social change. It emphasises the friction between fast expanding technologies and slower-changing social institutions, highlighting the importance of adaptive and responsive social structures in order to reap the benefits of technological advancement.

Background

Teachers indicate employing AI in a variety of means, but they are more likely to utilise it to help children with learning difficulties. It is possible that AI is merely making present teaching approaches smoother or quicker. For example, a teacher may utilise AI to quickly produce personalised homework for a student to practice a concept they had difficulty with in class. Educators may also use AI to provide a student who reads at the fourth grade level with access to high school social studies content. However, these relatively typical instructional tactics do

not always promote student growth. Understanding how teachers utilise AI to aid those who are having difficulty or have challenges and how successful it is are yet to be seen.

Global Trends in AI in Education

The world's first AI Minister in UAE is committed to crafting AI policy is already entangled in a worldwide battle for technological dominance. Microsoft (MSFT) announced in April a US$ 1.5 billion investment in G42, an AI business based in Abu Dhabi and chaired by a prominent member of the ruling royal family.[5] The UAE is one of the world's major producers of fossil fuels and Abu Dhabi views its AI initiative as critical to diversifying away from oil. According to a PwC Middle East estimate, AI might add US$ 96 billion to the UAE economy by 2030, accounting for approximately 14 per cent of its GDP.[6]

The UAE has developed a national strategy and the goal is to include applying AI in critical industries like energy and logistics, creating an ecosystem and attracting talent. The country is training public officials in AI and Dubai hopes to teach a million residents effective quick engineering, which involves guiding AI models to create high-quality output. In late 2023, the Abu Dhabi government-backed Technology Innovation Institute announced Falcon10B, a Large Language Model (LLM) that powers generative AI chatbots.[7]

It outperformed *Google* and *Meta* services on some criteria. "The UAE put a stake in the ground in the AI race with Falcon," James Lewis,

[5] Microsoft Source, "Microsoft Invests US$1.5 Billion in Abu Dhabi's G42 to Accelerate AI Development and Global Expansion," Stories, April 16, 2024, https://news.microsoft.com/2024/04/15/microsoft-invests-1-5-billion-in-abu-dhabis-g42-to-accelerate-ai-development-and-global-expansion/

[6] "The UAE Is on a Mission to Become an AI Power," *TIME*, March 20, 2024, https://time.com/6958369/artificial-intelligence-united-arab-emirates/.

[7] "Abu Dhabi-Based Technology Innovation Institute Introduces Falcon LLM: Foundational Large Language Model (LLM) Outperforms GPT-3 with 40 Billion Parameters," Www.tii.ae, August 12, 2024, https://www.tii.ae/news/abu-dhabi-based-technology-innovation-institute-introduces-falcon-llm-foundational-large

a technology expert at the Center for Strategic and International Studies (CSIS), a Washington DC-based think tank, told CNN.[8]

Unlike *ChatGPT* and *Google's Gemini*, *Falcon* and *Jais* are open-source, which implies that anybody can use or modify their programming. By opening up the technology, Abu Dhabi positions itself as an ally to underdeveloped countries who lack the wherewithal to develop their own AI capabilities.[9]

Apart from the UAE, major tech companies like *Google*, *Apple*, *Facebook* and *Microsoft* are headquartered in the United States, where they conduct cutting-edge AI research and development. The country is also home to famous colleges such as Stanford, the Massachusetts Institute of Technology (MIT) and the University of California, Berkeley which consistently produce top-tier AI talent.

In the United Kingdom, the emphasis on AI is integrated in a larger environment of technical innovation and digital transformation. The country has a long tradition of academic brilliance and research, as seen by the contributions of Oxford University, Cambridge University and Imperial College London to the field of AI.

It's worth noting that Canada has made major advances in AI. Canada, like the United Kingdom, places a high value on research and innovation, and its contributions to AI have received international acclaim. The presence of leading research institutions and universities in Canada is a major contributor to the country's AI prominence. The University of Toronto, for example, is home to prominent members of the AI community, and the Vector Institute for Artificial Intelligence is critical to fostering research and talent development. Canada's dedication to academic achievement has created an environment ripe for advancements in machine learning and AI algorithms.

---

[8] Amy Gunia, "Oil-Rich Abu Dhabi Wants to Be an AI Leader. Aligning with the US Is Just the Start," Newschannelnebraska.com, 2024, https://northeast.newschannelnebraska.com/story/50951480/oil-rich-abu-dhabi-wants-to-be-an-ai-leader-aligning-with-the-us-is-just-the-start

[9] Lisa Barrington, "Abu Dhabi Makes Its Falcon 40B AI Model Open Source," Reuters, May 25, 2023, https://www.reuters.com/technology/abu-dhabi-makes-its-falcon-40b-ai-model-open-source-2023-05-25/

Furthermore, the Canadian government has aggressively promoted AI initiatives. In 2017, Canada unveiled the Pan-Canadian Artificial Intelligence Strategy, investing significant amounts to attract and retain top AI talent, stimulate research and foster collaboration between academics and industry.[10] This strategic strategy has established Canada as a global leader in artificial intelligence research and development.

Canada, like the United Kingdom, places an emphasis on ethical aspects in AI development. The country prioritises responsible AI practices, privacy protection and openness. The Canadian Institute for Advanced Research (CIFAR) is an example of a research organisation that addresses the societal consequences of AI, therefore contributing to the ethical debate around Artificial Intelligence. [11]

In terms of industry, Canada has a thriving AI ecosystem, with noteworthy startups such as Element AI and OpenText making waves across multiple industries. Montreal, in particular, has emerged as a booming hub for AI innovation and startup activity. Canada's approach to AI demonstrates a dedication to inclusivity and diversity in the area. Efforts are being made to guarantee that the benefits of AI are available to everyone, and the Canadian government actively promotes diversity and inclusivity in STEM sectors, including AI research and development.

AI has the ability to solve some of today's most pressing educational concerns, re-invent methods of instruction and learning, and accelerate progress toward the SDG 4. However, rapid technological advancements unavoidably carry with them a slew of hazards and concerns that have outpaced policy discussions and rules and regulations to date. UNESCO is dedicated to supporting member states in harnessing the potential of AI technologies to achieve the Education 2030 Agenda, while ensuring that their deployment in educational contexts is governed by the key principles of inclusion and equity. A report from Accenture lists the share of profit increase in education industry by 2035 is 84 per cent.[12]

[10] Government of Canada, "Pan-Canadian Artificial Intelligence Strategy ─Home," ised-isde.canada.ca, July 20, 2022, https://ised-isde.canada.ca/site/ai-strategy/en.
[11] Government of Canada, "Pan-Canadian Artificial Intelligence Strategy ─ Home."
[12] UNESCO, "Artificial Intelligence in Education | UNESCO," UNESCO, 2019, https://www.unesco.org/en/digital-education/artificial-intelligence

Advantages of AI in education

People lack sufficient time to visit libraries, so they are becoming less popular. The primary cause for this is the increased use of Internet, which allows us to obtain any information with a single click using *Google*. It gives well-organised and detailed information. You don't have to wait in line to get materials and study aids for tests, or sit in libraries to do your assignment or research paper. You can receive textbooks and study materials by assessing apps like Bookshelf, textbooks, and many more, where you can evaluate digital textbooks. All schools and universities face similar difficulties, such as educational discontinuity and student disinterest. AI aids in the resolution of these issues by providing learning materials personalised to the student's interests and needs. Students can encounter unique information that captures their attention, helps them engage in their studies and keeps them engaged. Apps such as *Age of Learning* and *Kidaptive* are used to engage children and offer tailored learning routes based on their abilities.

Students with special needs typically confront numerous challenges in comparison to other kids; they have requirements that they occasionally discuss and sometimes do not. AI has become an increasingly important part in assisting children with special needs. Apps such as *Voiceitt* enable those with speech difficulties to communicate more effortlessly. The program use speech recognition technology to transcribe speech, even if it is not clear and consistent, and convert it to a more natural-sounding format. With this assistance, youngsters with autism and cerebral palsy can converse without difficulty. Silicon Valley is also very intrigued. In a March report, the Chan-Zuckerberg Initiative and the Bill and Melinda Gates Foundation selected Artificial Intelligence as an educational tool worth investing in.[13]

[13] Karen Hao, "China has Started a Grand Experiment in AI Education. It Could Reshape How the World Learns.," MIT Technology Review, August 2, 2019, https://www.technologyreview.com/2019/08/02/131198/china-squirrel-has-started-a-grand-experiment-in-ai-education-it-could-reshape-how-the/

China

Recently, as AI has taken the world by storm, China has been an avid user of AI for carrying out a variety of activities. According to a current survey, China has the greatest number of people adopting AI in work (75 per cent), ahead of India (66 per cent).[14] China uses AI in practically every industry, among the most important being education, where students are encouraged to use it in the classroom[15]. A high number of students in China are monitored by AI cameras and brain-wave trackers. This tracker determines when a learner is having difficulty understanding a topic and provides support and assistance to the student. While academics debated optimum practices, China has not delayed. In recent years, the nation's expenditure in AI-enabled teaching and learning has increased dramatically. *Tech behemoths*, startups and educational institutions have all rushed in. Tens of millions of kids increasingly utilise AI to learn, whether through additional tutoring programs like *Squirrel*'s, digital learning platforms like *17ZuoYe*, or even in traditional school settings. It is the world's largest experiment on AI in education and nobody can predict its results.[16]

China seeks to improve children's learning experiences. They intend to accomplish this by incorporating AI into education. AI may benefit kids in a variety of ways, including tailored tutoring and smart classrooms. At Jinhua Xiaoshun Primary School in eastern China, students wear a unique headband designed by *Brainco*, a US-based corporation. This headband measures student participation in the classroom.[17] According to the statistics, AI gadgets assist students who are having difficulty understanding a concept and then offer support to boost their learning.

[14] Lisa Barrington, "Abu Dhabi Makes Its Falcon 40B AI Model Open Source," *Reuters*, May 25, 2023, https://www.reuters.com/technology/abu-dhabi-makes-its-falcon-40b-ai-model-open-source-2023-05-25/

[15] Syeda Sabah Firdouse , "You Are Being Redirected...," APAC Entrepreneur, https://apacentrepreneur.com/do-you-know-how-china-uses-ai-in-schools/.

[16] Karen Hao, "China Has Started a Grand Experiment in AI Education. It Could Reshape How the World Learns.," MIT Technology Review, August 2, 2019, https://www.technologyreview.com/2019/08/02/131198/china-squirrel-has-started-a-grand-experiment-in-ai-education-it-could-reshape-how-the/

[17] Anthony Yoo, "How China Is Using Artificial Intelligence in Classrooms," Genieacademy, June 2020, https://www.genieacademy.com/blog/ai-in-education-in-china.-will-it-turn-students-into-mindless-drones

Then a company called *Squirrel* AI came to his middle school in Hangzhou, China, promising personalised tutoring.[18] There are no whiteboards, projectors or other equipment only a single table per room, designed for six to eight individuals. The laptop serves as the instructional medium. Teachers and pupils alike are staring attentively at screens. In one room, two pupils are wearing headsets and are engaged in an English tutoring session. In another, three students, including Zhou, attend three distinct math classes. They practice issues on paper before submitting them online. A teacher uses a real-time dashboard to keep track of the children in each classroom.[19] At various points, both teachers see something on their screens, prompting them to walk over to bend next to a student's seat probably to answer a query that the teaching system is unable to answer. "It's so quiet," I whisper to the small group of school and company employees gathered for my tour. The Hangzhou regional director smiles proudly, saying, "There are no sounds of teachers lecturing."[20]

Squirrel is not the first business to explore the idea of an AI tutor. The first attempts to "replicate" teachers date back to the 1970s, when computers became widely employed in education. Then, between 1982 and 1984, multiple studies in the U.S. found that students who received one-on-one human tutoring performed significantly better than those who did not. This sparked a fresh round of efforts to recreate that level of individual attention in a computer. The end result was adaptive learning systems, which are now found everywhere from kindergartens to business training facilities[21] In 2024, China's Ministry of Education

[18] Hao, "China Has Started a Grand Experiment in AI Education." https://www.technologyreview.com/2019/08/02/131198/china-squirrel-has-started-a-grand-experiment-in-ai-education-it-could-reshape-how-the/

[19] Wall Street Journal, "How China Is Using Artificial Intelligence in Classrooms | WSJ," *YouTube*, October 1, 2019, https://www.youtube.com/watch?v=JMLsHI8aV0g

[20] Yifan Wang, Shen Hong and Crystal Tai, "How China Is Using Artificial Intelligence" *Wall Street Journal, October 24, 2019, https://www.wsj.com/articles/chinas-efforts-to-lead-the-way-in-ai-start-in-its-classrooms-11571958181*

[21] Voskoglou, Michael Gr., and Abdel-Badeeh M. Salem, "Benefits and Limitations of the Artificial with Respect to the Traditional Learning of Mathematics," *Mathematics* 8, no. 4 (2020): 611, https://doi.org/10.3390/math8040611

revealed a list of 184 primary and secondary schools selected based on Ed-Tech, with the goal of better fostering the growth of AI education.[22]

To assist the adoption of AI education, elementary and secondary schools ought to concentrate on Ed-Tech, general technology and other related courses, improve educational and teaching resources and provide classroom instruction and supervision. It will strengthen guidance for the designated bases, encouraging them to play an exemplary and leading role in developing AI school-based curricula, integrating disciplines, reforming teaching methods, jointly constructing and sharing digital education resources, cultivating teachers' digital literacy and fostering students' holistic development among other responsibilities.

India

AI is certainly a game breaker in the Indian education industry. As we move forward, we need to embrace AI responsibly, using its promise to create a diverse and innovative educational environment that benefits all learners. In India, the use of AI into education has demonstrated extraordinary commitment, changed established techniques and ushered a new era of personalised learning and creativity. India is an influential nation in the international education sector, with one of the largest networks of higher education institutions in the world. According to the The Indian Bureau of Economic research, India has 41.38 million students enrolled in higher education in the year 2020-21, and the size of the online education industry in India is predicted to expand by US$ 2.28 billion.[23]

The *NitiAayog*, Government of India, recently released a Working Paper on National Strategy for Artificial Intelligence, in which the focus is "AI for All" to leverage transformative technologies to ensure social and equitable progress. The study highlights Education as one of the

[22] 王丹宁, "China Releases List of 184 AI Education Bases in Schools," www.chinadaily.com.cn, February 23, 2024, https://www.chinadaily.com.cn/a/202402/23/WS65d85a3aa31082fc043b8ccb.html
[23] Divya Chopra, "How AI Is a Game Changer in the Education Sector," *India Today*, December 18, 2023, https://www.indiatoday.in/education-today/featurephilia/story/ai-game-changer-education-sector-2477394-2023-12-18

major areas of AI's concentration in India.[24] The Indian Ed-Tech market is expected to reach US$10.4 billion by 2025, led by increased usage of AI and digital learning platforms.[25] According to a KPMG analysis, AI-powered learning systems have demonstrated a 20-30 per cent boost in student engagement and retention rates compared to traditional techniques.[26]

In a Bengaluru classroom, a half-dozen young learners sit at a computer, listening attentively to a small black device while a woman's voice says out simple English phrases which they carefully repeat. An *Amazon Echo Dot* speaker, employs AI enabled voice recognition technology to assist students in improving their reading, listening and speaking skills in English.[27]

"A large number of schools in India don't have enough money for high-tech solutions and parents are unable to pay additional tutoring support," said Gowri Mahesh, a co-founder at Learning Matters, the Bengaluru-based Ed-tech startup that designed Tara which is utilised in roughly 200 schools across three Indian states. "English language proficiency is one such gap." The solution needed to be light on hardware, accessible, affordable, impartial, and appropriate for a variety of needs." The Andhra Pradesh Education Department and Intel India have jointly built the state's first AI Skills Lab. The Intel AI for Youth programme is training up to 500 pupils from grades VII to X at Cheepurupalli's ZP High School.[28]

[24] Gurumurthy Kasinathan, "Making AI Work in Indian Education," *SSRN Electronic Journal*, 2020, https://doi.org/10.2139/ssrn.3873187

[25] eSchool News Staff, "Open English Acquires India's English-Learning Platform Enguru," eSchool News, August 18, 2022, https://www.eschoolnews.com/newsline/2022/08/18/open-english-acquires-indias-english-learning-platform-enguru/

[26]Aparajitha Nair, "Need for Leveraging AI in India's Education Sector," *Hindustan Times*, May 23, 2024, https://www.hindustantimes.com/ht-insight/future-tech/need-for-leveraging-ai-in-indias-education-sector-101716450004610.html

[27] *Reuters*, "Bridging the Learning Gap in Indian Schools: Is Generative AI the Answer?," *Frontline*, December 19, 2023, https://frontline.thehindu.com/news/education-is-generative-ai-answer-to-bridge-learning-gaps-in-indian-schools/article67654113.ece

[28] *Reuters*, "Bridging the Learning Gap in Indian Schools."

Teachers also received training through the 'AI for All' programme. The lab will help kids and teachers prepare for an AI-ready future. It was created with the goal of demystifying AI for young people and providing them with the necessary attitude, competencies, and resource sets for AI preparation.

The lab was designed to be an exclusive space for learners to practice their skills, and it is equipped with freely available and adaptable technologies. According to officials, the lab will enable and encourage young people to build meaningful social impact projects using the Intel AI for Youth program.

There are three areas of the AI Skills Lab: the Educational Corner, the Development Corner, and the Inference Corner. While the Education Corner aims to help students comprehend AI ideas, the Development Corner will teach them how to use AI models in order to create AI-enabled socially beneficial projects. One of the biggest difficulties that Andhra Pradesh faces is an elevated rate of dropout among kids. To develop the state into a technological hub, school dropout rates have to be reduced and youth job prospects must be increased. [29]

In December 2015, the Andhra Pradesh government signed an agreement of cooperation with *Microsoft* to address this issue using AI technology. [30] An application was created utilising *Microsoft's* Azure machine learning platform to assist the state education department in predicting school dropout rates. To identify predictive trends, the program evaluates complicated data sets that include enrolment, student performance, gender, socioeconomic demographics, school infrastructure, and instructor competencies.

[29] Express News Service, "AP's 1st AI Lab Set up at Cheepurupalli ZP School," *New Indian Express*, March 5, 2024, https://www.newindianexpress.com/states/andhra-pradesh/2024/Mar/05/aps-1st-ai-lab-set-up-at-cheepurupalli-zp-school.

[30] Y. MALLIKARJUN, "A.P. Signs MoU with Microsoft," *Hindu*, December 28, 2015, sec. Business, https://www.thehindu.com/business/A.P.-signs-MoU-with-Microsoft/article60227439.ece

The tool proactively identified probable dropouts and provided an analysis of the major variables causing the issue. More than 60 patterns were observed which helped to track dropouts.[31]

For the school year 2018-2019, the platform identified 19,500 potential dropouts in the Vishakhapatnam area. The main reasons for these dropouts were a lack of furnishings and inadequate restroom facilities. The application also found other relevant elements, including educational results (57 per cent), facilities (31 per cent), mobility (7 per cent), age inappropriateness (4 per cent), and social classification (1 per cent).[32] This resulted in the monitoring, counselling, and resolving the difficulties of students who were likely to drop out. On the basis of the analysis, the government decided to launch campaigns to promote enrollment in government schools by spreading knowledge about the benefits of public education for both kids and their parents.

Currently, the government uses the Vidyarthi Nestham smartphone program, which enables four to five projected school dropouts per instructor in each school. After knowing the cause for their pupils' dropping out as stated on the application, the professors begin mentoring them. More than 10,000 schools in Andhra Pradesh have already successfully used the app, allowing more kids to complete their education and graduate as marketable new workers who will help the economy thrive. The government has now expanded the scheme to all 13 districts, affecting more than 5 million kids in all grades.[33]

Development in Pakistan: Adapting Best Practices

Despite the attractive prospects, integrating AI into Pakistani education presents hurdles. Limited access to AI technology due to price constraints

[31] "AI Is Being Used to Identify Potential School Dropout Rate in Andhra Pradesh," *INDIAai*, ., https://indiaai.gov.in/case-study/ai-is-being-used-to-identify-potential-school-dropout-rate-in-andhra-pradesh.

[32] Umamaheswara Rao, "Govt Ties up with Microsoft to Check Dropouts," *Times of India,* April 21, 2018, https://timesofindia.indiatimes.com/city/visakhapatnam/govt-ties-up-with-microsoft-to-check-dropouts/articleshow/63863010.cms

[33] "Making Technology in Schools Effective," *Hindustan Times*, May 20, 2024, https://www.hindustantimes.com/ht-insight/knowledge/making-technology-in-schools-effective-101716197882573.html

and insufficient facilities presents challenges. Ethical considerations for data privacy, security and potential biases in AI systems necessitate attention and regulation. However, Pakistan and its education officials have acknowledged AI's promise in education. AI-driven tutoring systems and adaptive learning platforms have positively improved students' learning results, as demonstrated by projects such as the Information Technology University's "*RoboTutor*" and "*Zaya Learning Labs.*"[34] The authorities are inclined towards the development of such programs that would leverage the incorporation of AI and construct automated programs that would aid to boost the student learning potential.[35]

AI has also been shown to improve teaching techniques and learning resources, as well as foster innovation. One of these AI-based projects is the Punjab Government's "*TaleemGhar*" initiative, which was mostly implemented during the COVID-19 pandemic. The program uses AI-powered techniques to broadcast instructional content on television and other online platforms. The initiative ensured that learning continued despite the shutdown of schools and universities. Pakistan has achieved great progress in AI education in recent years, thanks to the President's Initiative on Artificial Intelligence and Computing (PIAIC).[36] This effort is training a new generation of AI practitioners, preparing Pakistan's youth to meet the demands of the future employment market.

PIAIC's objective is to alter Pakistan via the use of cutting-edge technology in education, research and business. We want Pakistan to be a global powerhouse for artificial intelligence, data science, cloud native computing, edge computing, blockchain, augmented reality and the

[34] UNSECO, "Working Papers on Education Policy 07 Artificial Intelligence in Education: Challenges and Opportunities for Sustainable Development Education Sector United Nations Educational, Scientific and Cultural Organization," 2019, https://www.gcedclearinghouse.org/sites/default/files/resources/190175eng.pdf

[35] Sidra Awais, "Artificial Intelligence and Its Impact on Education in Pakistan," Educations.pk, January 19, 2024, https://educations.pk/blog/2024/01/19/artificial-intelligence-and-its-impact-on-education-in-pakistan/#:~:text=Projects%20like%20the%20%E2%80%9CRoboTutor%E2%80%9D%20project

[36] "Presidential Initiative for Artificial Intelligence & Computing," https://www.piaic.org/

internet of things. [37]Sindh has also created the Governor's Initiative, a free initiative that offers a variety of AI and deep learning courses. This effort is founded on *Edtech*, which gives technology education to young people so that they can compete for jobs on a global and national scale. Pakistan has drafted a national AI policy that comprises of four pillars: *(i) AI market enablement; (ii) Enabling AI through awareness and readiness;(iii)* Building *progressive and trusted environment; and (iv) Transformation and evolution.* Pakistan, despite economic challenges, the government has allocated PKR 723 million for the promotion of AI in 2022. [38]

While the document emphasises the fundamental understanding and awareness of personal data protection and AI, it also aims to stimulate an incremental impact of AI on society from the grassroots. Therefore, the policy has given equal importance to teaching algorithms, data science and AI in Science, Technology, Engineering and Mathematics (STEM) education. The policy suggestions include forming of a STEM education expert working committee for reviewing the National High-Tech Curriculum Draft.

Policy Recommendations

To successfully leverage AI in education, it is crucial to shift the narrative away from AI as a potential threat and toward its ethical development. Collaborative efforts between educators, policymakers and AI developers are needed to ensure that AI enhances education rather than undermining it. Draft AI policy published by Pakistan's Ministry of Information Technology and Telecommunication seeks to create an enabling environment for the responsible use of AI.

The potential of AI to revolutionise education is vast. A "train the trainers" program, combined with the necessary infrastructure for both trainers and trainees, is vital to maximise AI's application in education. It

[37] "Presidential Initiative for Artificial Intelligence & Computing," https://www.piaic.org/

[38] Rubia Shoukat, "From Sci Fi Dreams to Everyday Realities the Impact of AI," *Express Tribune*, May 13, 2024, https://tribune.com.pk/story/2466304/from-sci-fi-dreams-to-everyday-realities-the-impact-of-ai.

is imperative to employ AI as a tool for the development of tailored educational curricula for students to augment their competencies vis-a-vis deficiencies. It is further suggested to integrate the latest neuromorphic computing into the educational framework as a pivotal component of this endeavor. In this regard it is important to hire a local or international consultant with expertise in high-tech curriculum development to develop a National Curriculum on Algorithms, Data Sciences, AI and Allied Technologies from the sixth to the twelfth standard. Many private initiatives exist *which* provides a learning platform for school-aged students, focusing on computer sciences and information technology-related curriculum, offering online coding camps to young learners from 6 to 15 plus years. By initiating ethical AI development programs through public-private partnerships, we can navigate the challenges and unlock the full transformative potential of AI. To standarise and harmonise AI training there is a need to establish AI cities or universities focused on these cutting-edge technologies which must be regulated under the HEC in leading cities of Pakistan with attractive grants and scholarships. Collaboration with international universities for training and transfer of technology (ToT) is also vital. Infrastructure is majorly missing in Pakistan and for that, baseline manufacturing structure must be incentivised. This revolution is not just about embracing technology; it is about improving the future prospects of learners worldwide and ushering in an era of inclusive, personalised and effective education aimed at envisioning prosperous Pakistan in the future.

Conclusion

Regardless of the problems and opportunities presented by AI, one thing is certain: AI is here to stay in the field of education. As technology advances, we may expect more AI-friendly classrooms around the world. As humans who invented AI, we must be responsible and find the appropriate balance between technology and humanity.

The use of AI has the potential to improve learning via making it more personalised, effective and inclusive. The experiences of China and India teach Pakistan significant lessons as it attempts to improve its educational system. Pakistan may make substantial progress toward improving educational outcomes and equipping its students for the future

by adopting and adapting AI-driven educational practices from its neighboring nations. Pakistani academia can use AI based technology in improving the library network and it can be further expanded to the secondary schools gradually.

This means that today's educational environment should highlight each student's unique abilities and interests rather than imparting an established body of information better suited to the industrial age. AI, in theory, might make this simpler. It might take over certain rote duties in the classroom, allowing instructors to devote more attention to each learner. There are other hypotheses on what that might appear. Perhaps AI will teach certain types of information while humans teach others; perhaps it will assist teachers in tracking student performance or provide students with greater control over how they learn.