International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 09 Issue: 04 | April - 2025 SJIF Rating: 8.586 ISSN: 2582-3930

A Study on National Strategy for Artificial Intelligence-Focus Area AI Intervention in Education

Dr. S. POORNIMA
Associate Professor
PG Centre, Vidyavardhaka First Grade College
Sheshadri Iyer Road, Mysuru, Karnataka

Abstract: *Artificial Intelligence (AI) is poised to disrupt our world. With intelligent machines enabling high-level cognitive processes like thinking, perceiving, learning, problem solving and decision making, coupled with advances in data collection and aggregation, analytics and computer processing power, AI presents opportunities to complement and supplement human intelligence and enrich the way people live and work. India, being the fastest growing economy with the second largest population in the world, has a significant stake in the AI revolution. Recognising AI's potential to transform economies and the need for India to strategies its approach, Hon'ble Finance Minister, in his budget speech for 2018 – 2019, mandated NITI Aayog to establish the National Program on AI, with a view to guiding the research and development in new and emerging technologies. In pursuance of the above, NITI Aayog has adopted a three-pronged approach – undertaking exploratory proof-of-concept AI projects in various areas, crafting a national strategy for building a vibrant AI ecosystem in India and collaborating with various experts and stakeholders. Since the start of this year, NITI Aayog has partnered with several leading AI technology players to implement AI projects in critical areas such as agriculture and health. Learning from these projects, under various stages of implementation, as well as our engagement with some of the leading institutions and experts have given a better perspective to our task of crafting the national strategy for AI, which is the focus of this discussion paper.*

Keywords: AI, NITI Aayog, Education,

1. INTRODUCTION: AI refers to the ability of machines to perform cognitive tasks like thinking, perceiving, learning, problem solving and decision making. Initially conceived as a technology that could mimic human intelligence, AI has evolved in ways that far exceed its original conception. With incredible advances made in data collection, processing and computation power, intelligent systems can now be deployed to take over a variety of tasks, enable connectivity and enhance productivity. As AI's capabilities have dramatically expanded, so have its utility in a growing number of fields.

The truly transformative nature of the technology, yet the nascent stage of its adoption worldwide, provides India with an opportunity to define its own brand of AI leadership. #AIforAll - the brand proposed for India implies inclusive technology leadership, where the full potential of AI is realised in pursuance of the country's unique needs and aspirations. The strategy should strive to leverage AI for economic growth, social development and inclusive growth, and finally as a "Garage" for emerging and developing economies.

While AI has the potential to provide large incremental value to a wide range of sectors, adoption till date has been driven primarily from a commercial perspective. Technology disruptions like AI are once-in-a-generation phenomenon, and hence large-scale adoption strategies, especially national strategies, need to strike a balance between narrow definitions of financial impact and the greater good. NITI Aayog has decided to focus on five sectors that are envisioned to benefit the most from AI in solving societal needs:

a) Healthcare: increased access and affordability of quality healthcare,

b) Agriculture: enhanced farmers' income, increased farm productivity and reduction of wastage,

c) Education: improved access and quality of education,

d) Smart Cities and Infrastructure: efficient and connectivity for the burgeoning urban population, and

e) Smart Mobility and Transportation: smarter and safer modes of transportation and better traffic and congestion problems.

2. REVIEW OF LITERATURE:

- In the article **Evaluating the intention for the adoption of artificial intelligence-based robots in the university to educate the students** by Roy, R., Babakerkhell, M. D., Mukherjee, S., Pal, D., &Funilkul, S. (2022), Teachers, students, and universities all had new functions since AI was introduced into the classroom. The goal of AI-powered educational platforms and technologies is to improve teaching and learning by facilitating individualized instruction, informed decision- making, and streamlined administration. Intelligent tutoring, predictive analytics, and administrative automation are just a few of the features offered by these tools, all of which help educational institutions better meet the requirements of their students, work more efficiently, and make more data-driven decisions.
- In the study **Possibilities and Challenges of Compounding Artificial Intelligence in India's Educational Landscape. International Journal of Advanced Science and Technology**, By Alam, A. (2020), The understanding the impact of AI in higher education is vital for various reasons. First, it helps teachers and lawmakers take advantage of AI's potential gains while also overcoming the problems that plague the field. This information is crucial for the development of future higher education policies that will ensure the sector continues to meet the needs of students and the labor market.
- In the article **Artificial intelligence for assessment and feedback to enhance student success in higher education** by Hooda, M., Rana, C., Dahiya, O., Rizwan, A., & Hossain, M. S. (2022), The incorporation of AI has a direct impact on students' learning outcomes, engagement, and skill development in the classroom. Therefore, it is crucial to understand these effects in order to provide the best education possible for pupils. Last but not least, the use of AI in universities brings up ethical and privacy considerations that need to be properly navigated to safeguard students' rights and data.
- In the study **Education 4.0 using artificial intelligence for students performance analysis** by Chen, Z., Zhang, J., Jiang, X., Hu, Z., Han, X., Xu, M., & Vivekananda, G. N. (2020), The application of AI in Massive Open Online Courses (MOOCs) to provide scalable, tailored learning experiences to a worldwide audience is a prime example of such an effort. Universities may now provide remote, yet interactive, hands-on learning experiences by utilizing AI-driven educational tools such as intelligent tutoring systems and virtual labs.
- In the policy **Academic policy regarding sustainability and artificial intelligence (AI)** by Tanveer, M., Hassan, S., & Bhaumik, A. (2020, intelligent tutoring systems can provide immediate feedback and direction to pupils, based on their unique preferences and progress. Adaptive learning systems automatically modify course materials and individualized study plans to meet the needs of each individual learner. Teachers may now better cater to each student's needs with the help of these resources

3. OBJECTIVES OF THE STUDY:

1. To evaluate how far artificial intelligence (AI) has journey in Indian higher education.

2. To learn how much of an effect artificial intelligence has on Indian higher education system.

4. RESEARCH METHODOLOGY:

a) Research Method: Research is done by considering the conceptual research.

b) Data Collection: For obtaining the information secondary data is used by considering different literature review, newspaper articles, research journals, Government and Non-Governmental reports and the Niti Aayogo website and reports.

5. DISCUSSION:

An effective education sector has the ability to transform a country through development of human resources and increased productivity. In the context of emerging countries particularly, levels of education and literacy of the population play an important role in development and overall transition to an advanced economy.

In India, the importance of a developed education sector is amplified by a large youth population. Estimates indicate that currently over half the population of the country is below the age of 25. As the adoption of digital means of gathering data increases, it is important that these methods are effectively leveraged to deliver improved education and teaching.

The adoption of technology in education is improving, though not at the pace required. It is estimated that schools globally spent nearly USD160 billion on education technology, or 'EdTech', in 2016, and forecast spending to grow 17% annually through 2020. Private investment in educational technology, broadly defined as the use of computers or other technology to enhance teaching grew 32% annually from 2011 through 2015, rising to USD4.5 billion globally. Adoption of new technologies is still lacking, however, often attributed to unwillingness of teachers and students to adopt technology.

School education in India has seen substantial progress in recent decades, with efforts at both the Central and State levels, and substantive gains in enrolment have been achieved – Gross Enrolment Ratio (GER) is 97% at elementary level and 80% at secondary level, as per recent figures. However, low retention rates and poor learning outcomes mar the impact of gains in enrolment.

a) Low retention rates: Enrolment of children is of little use if children are not retained in the schooling system. Retention rate of 70.7% at elementary level indicates that one-third of enrolled children drop out before completing Class 8. Retention rate at secondary level is also poor at 57.4%. Low quality of education is one of the causes of poor retention.

b) Poor learning outcomes: There is increasing concern about the poor learning levels of children in school, and a new National Achievement Survey (NAS) was recently conducted in November 2017. Previous rounds of NAS results provide an insight into longitudinal performance over time – average performance of States / UTs on previous rounds showed that over 60% of Class 5 students scored below 50% across subjects; and for majority of the 31 States / UTs tested, performance significantly deteriorated in NAS Cycle-4 versus Cycle-3. Assessments from the perspective of basic foundational skills also indicate poor learning outcomes – in rural areas, only 47.8% of Class 5 children could read Class 2 level text and only 26% could do Class-5-level arithmetic.

The above scenario is a consequence of a complex interplay of factors that pose challenges to improving the quality of education:

a) Multi-grade and multi-level classrooms: For a large proportion of schools, especially in small or remote villages, it is not viable to have separate classrooms and teachers for different grades / classes. Consequently, the teacher is faced with a heterogeneous group of children in the same classroom, with wide variations in their classes, ages, abilities and learning levels. This large variation poses a huge challenge to the teacher and is a common cause of poor teaching-learning, thus leading to poor learning outcomes.

b) Lack of interactive pedagogy and ineffective remedial instruction: Teaching-learning processes in most classrooms are highly rote-based and non-interactive. Remedial instruction, where conducted, typically lacks customisation to the child's learning level, abilities, and pace of learning.

c) Inadequate attention / action for likely drop-outs: Several children may be at risk of dropout due to various factors, such as inadequate school infrastructure, poor teachers, poor school readiness, language barriers, large learning gaps with respect to grade level, family circumstances (e.g. migrant families), poor nutritional or health status, etc.

d) Large teacher vacancies due to uneven distribution across locations: Large number of teacher vacancies is mostly not due to an overall shortage of teachers in a State – instead, they are due to uneven distribution across different geographical areas within the State. For instance, recent figures for Uttar Pradesh revealed 1.74 lakh teacher vacancies at elementary school level, but a simultaneous surplus of 0.66 lakh teachers across the state.

d) Professional development courses / training do not cater to real needs and have poor coverage: Existing teacher training is typically a generic kind of an exercise. It is not linked to the specific weaknesses / requirements of a teacher – for instance, a teacher with poor arithmetic understanding requires corresponding training to clarify arithmetic concepts. Consequently, most teacher training exercises end up as wasted public expenditure, with little or no benefit to the teacher and her / his students. Similar issues exist with respect to training of other staff such as school headmasters/principals. The coverage of existing training programs is also extremely low, typically less than 20% annually.

e) Low adoption of existing technologies: A recent survey found that level of adoption of technology in schools is lacking, and can be largely attributed to lack of teacher training, despite provision of the ICT infrastructure. While 83% of the teachers surveyed use computers, the use is limited primarily to audio / visual display, or student practice. A meagre 41% and 27% use technology for tracking student data and participating in forums respectively. This trend is even more pronounced in the low fee school segment surveyed19. Another trend observed is that trained teachers are much more likely to use technology in the classroom. 88% of trained teachers reported making use of available computers as compared to only 53% of untrained teachers. Trained teachers were found to be nearly twice as likely to report using technology for communication purposes and for online forum participation.

According to EdTechXGlobal, EdTech is becoming a global phenomenon, and as distribution and platforms scale internationally, the market is projected to grow at 17.0% per annum, to USD252 billion by 2020. India's digital learning market was valued at USD2 billion in 2016 and is projected to grow at a CAGR of 30%, reaching USD5.7 billion in 2020 as per estimates from Technopak.

As per Forbes, in 2017, across every market involved in EdTech, international funding reached a new record of USD9.52 billion, and 813 different EdTech companies received funding last year. These EdTech investments mark a gain of 30% from 2016. VC interest in the education space continues to grow. For example, one of India's leading EdTech start-ups Byju's raised USD40 million from Tencent in July 2017, just four months after raising USD30 million from Belgium-based Verlinvest. Among Byju's other investors include Sequoia Capital and The Chan Zuckerberg Foundation.

AI has the potential to bring about changes in the sector by supplementing pedagogy and establishing systems to inform and support decision making across stakeholders and administrative levels. However, implementation of AI must be preceded by efforts to digitise records of teacher performance, student performance, and curriculum. Several AI tools are being successfully used in other parts of the world, and they can be adapted to the Indian context to target specific challenges.

a) Adaptive learning tools for customised learning: While AI may not completely replace a teacher, it has the potential to greatly assist teachers in efficiently and effectively managing multi-level / multi-grade classrooms, by judging learning levels of individual students, and allowing automated development of customised educational content adapted to each child's class and learning level. Assessing time spent by a student on each part / page of the learning material, for example, would allow real-time feedback on student performance to help the teacher appropriately tailor her guidance to the child. This concept can be extended to automatic grading of tests, as well.

b) Intelligent and interactive tutoring systems: Intelligent Tutoring Systems can provide great benefit to students through delivery of learning materials adapted to the child's proficiency level, learning style, and pace of learning. In-built pop-up questions tailored to students, for example, can help increase interactivity, and catch student's attention and interest. It can also help in assessment of student's level of attention or comprehension to appropriately design remedial instruction. Grade Guardian, for example, uses predictive models and visualisations for student performance with an interactive dashboard showing anticipated effect of policy changes. Submission includes 3 components packaged as a single web app – a Chatbot that inputs student information, an Advisor Console that shows students at risk, and a prediction module for policymakers.

c) Predictive tools to inform pre-emptive action for students predicted to drop out of school: Analysis of test results and attendance records using AI can be used to predict probable student activities and inform pre-emptive action. For instance, in a recent preliminary experiment conducted in Andhra Pradesh, AI applications processed data on all students based on parameters such as gender, socio-economic factors, academic performance, school infrastructure, teacher skills, etc., with the objective of helping the government identify students likely to drop out. Test results could inform suggestions to enrol students in vocational studies. Additionally, redressed mechanisms could be put in place to identify students whose performance can be improved by focus of existing schemes to their family.

d) Automated rationalisation of teachers: AI tools can be used to develop automated teacher posting and transfer systems, using analytics based on demand – supply gaps across schools in the State, candidate's prior postings, candidate preferences, etc. This would help in plugging of gaps in teacher distribution more effectively.

e) Customised professional development courses: To tackle issues of poorly designed professional development courses with poor coverage, adaptive AI tools can be used to design automated, customised professional development training content for the teacher based on their performance, identification of their knowledge and skill gaps. This could then be continuously adapted as teacher's skills and concepts improve.

6. SUGGESTION:

Data is one of the primary drivers of AI solutions, and thus appropriate handling of data, ensuring privacy and security is of prime importance. Challenges include data usage without consent, risk of identification of individuals through data, data selection bias and the resulting discrimination of AI models, and asymmetry in data aggregation. The paper suggests establishing data protection frameworks and sectorial regulatory frameworks, and promotion of adoption of international standards.

In order for India to ride the AI innovation wave, a robust intellectual property framework is required. Despite a number of government initiatives in strengthening the IP regime, challenges remain, especially in respect of applying stringent and narrowly focused patent laws to AI applications – given the unique nature of AI solution development. The importance of data to development of useful models is one such example. To tackle these issues, establishment of IP facilitation centers to help bridge the gap between practitioners and AI developers, and adequate training of IP granting authorities, judiciary and tribunals is suggested.

7. CONCLUSION:

The education sector needs to be re-aligned in order to effectively harness the potential of AI in a sustainable manner. In primary and secondary schools, there is a need for transition to skill based education in subjects relevant to AI. Often criticised for being overly knowledge intensive, Indian education is in urgent need of transition particularly in subjects relevant to STEM, or computer based education. As jobs based on technology become prominent, so will the need to develop applied skills in a continuously changing environment.

Increased amount of project related work across education levels, promoting schemes like the establishment of ATLs (Atal Tinkering Labs) in schools, necessary change in curricula in schools, are some of the steps that need to be considered to promote early adoption of technology organically.

In higher education institutions there is need for increased collaboration between industry and academia through creation of channels of communication between faculty and industry to promote exchange of ideas and expertise. Various avenues of collaboration need to be explored, including workshops, incentives for guest lectures by professionals and institutional arrangements for regular re-design of courses in collaboration with the private sector.

Lack of qualified faculty that poses a serious problem in the present scenario can be addressed through innovative initiatives like credit-bearing MOOCs (Massive Open Online Courses). Acceptability and adoption of these decentralised teaching mechanisms can be ensured through prescribed certification in collaboration with the private sector and educational institutions. Initiatives such as the SWAYAM platform are in the right direction but these need to be further reinforced through additional investment and collaboration with the private sector and educational institutions in order to meet the market demand.

Superior research capabilities have been the cornerstone of leadership aspirations in emerging technologies and effectively realising the growth potential requires expertise in both core and applied research. Despite indications of recent positive efforts in this aspect of technology, AI research in India is still in its infancy and requires large scale concerted and collaborative interventions.

REFERENCE:

- Alam, A. (2020). Possibilities and challenges of compounding artificial intelligence in India's educational landscape. Alam, A.(2020). Possibilities and Challenges of Compounding Artificial Intelligence in India's Educational Landscape. International Journal of Advanced Science and Technology, 29(5), 5077-5094.
- Alam, A. (2021, November). Possibilities and apprehensions in the landscape of artificial intelligence in education. In 2021 International Conference on Computational Intelligence and Computing Applications (ICCICA) (pp. 1-8). IEEE.
- Almaiah, M. A., Alfaisal, R., Salloum, S. A., Hajjej, F., Shishakly, R., Lutfi, A., & Al- Maroof, R. S. (2022). Measuring institutions' adoption of artificial intelligence applications in online learning environments: Integrating the innovation diffusion theory with technology adoption rate. Electronics, 11(20), 3291.
- Almaiah, M. A., Alfaisal, R., Salloum, S. A., Hajjej, F., Thabit, S., El-Qirem, F. A., & Al- Maroof, R. S. (2022). Examining the impact of artificial intelligence and social and computer anxiety in e-learning settings: Students' perceptions at the university level. Electronics, 11(22), 3662.
- Bahroun, Z., Anane, C., Ahmed, V., & Zacca, A. (2023). Transforming Education: A Comprehensive Review of Generative Artificial Intelligence in Educational Settings through Bibliometric and Content Analysis. Sustainability, 15(17), 12983.
- Chatterjee, S., & Bhattacharjee, K. K. (2020). Adoption of artificial intelligence in higher education: A quantitative analysis using structural equation modelling. Education and Information Technologies, 25, 3443-3463.
- Chen, Z., Zhang, J., Jiang, X., Hu, Z., Han, X., Xu, M., & Vivekananda, G. N. (2020). Education 4.0 using artificial intelligence for students performance analysis. Inteligencia Artificial, 23(66), 124-137.
- Hamadneh, N. N., Atawneh, S., Khan, W. A., Almejalli, K. A., &Alhomoud, A. (2022). Using Artificial Intelligence to Predict Students' Academic Performance in Blended Learning Sustainability, 14(18), 11642.
- Hooda, M., Rana, C., Dahiya, O., Rizwan, A., & Hossain, M. S. (2022). Artificial intelligence for assessment and feedback to enhance student success in higher education. Mathematical Problems in Engineering, 2022.
- Hsu, T. C., Chang, C., & Jen, T. H. (2023). Artificial Intelligence image recognition using self-regulation learning strategies: effects on vocabulary acquisition, learning anxiety, and learning behaviours of English language learners. Interactive Learning Environments, 1- 19.

- Ibrahim, H., Liu, F., Asim, R., Battu, B., Benabderrahmane, S., Alhafni, B., & Zaki, Y. (2023). Perception, performance, and detectability of conversational artificial intelligence across 32 university courses. Scientific Reports, 13(1), 12187.
- İçen, M. (2022). The future of education utilizing artificial intelligence in Turkey. Humanities and Social Sciences Communications, 9(1), 1-10.
- Khalid, N. (2020). Artificial intelligence learning and entrepreneurial performance among university students: evidence from malaysian higher educational institutions. Journal of Intelligent & Fuzzy Systems, 39(4), 5417-5435.
- Kopalle, P. K., Gangwar, M., Kaplan, A., Ramachandran, D., Reinartz, W., & Rindfleisch, A. (2022). Examining artificial intelligence (AI) technologies in marketing via a global lens: Current trends and future research opportunities. International Journal of Research in Marketing, 39(2), 522-540.
- Kshirsagar, P. R., Jagannadham, D. B. V., Alqahtani, H., Noorulhasan Naveed, Q., Islam, S., Thangamani, M., & Dejene, M. (2022). Human intelligence analysis through perception of AI in teaching and learning. Computational Intelligence and Neuroscience, 2022.
- Kunal, K., Mary, S. S. C., Xavier, M., & Arun, C. J. (2022). A Marketing Survey on Precision Learning using Artificial Intelligence and Its Impact In India. Academy of Marketing Studies Journal, 26(2).
- Laupichler, M. C., Aster, A., Schirch, J., & Raupach, T. (2022). Artificial intelligence literacy in higher and adult education: A scoping literature review. Computers and Education: Artificial Intelligence, 100101.
- Malik, A. R., Pratiwi, Y., Andajani, K., Numertayasa, I. W., Suharti, S., & Darwis, A. (2023). Exploring Artificial Intelligence in Academic Essay: Higher Education Student's Perspective. International Journal of Educational Research Open, 5, 100296.
- Mannuru, N. R., Shahriar, S., Teel, Z. A., Wang, T., Lund, B. D., Tijani, S., ... & Vaidya, P. (2023). Artificial intelligence in developing countries: The impact of generative artificial intelligence (AI) technologies for development. Information Development, 02666669231200628.
- Paek, S., & Kim, N. (2021). Analysis of worldwide research trends on the impact of artificial intelligence in education. Sustainability, 13(14), 7941.
- Pande, K., Jadhav, V., & Mali, M. (2023). Artificial Intelligence: exploring the attitude of secondary students. Journal of e-Learning and Knowledge Society, 19(3), 43-48.
- Qawaqneh, H., Ahmad, F. B., &Alawamreh, A. R. (2023). The Impact of Artificial Intelligence- Based Virtual Laboratories on Developing Students' Motivation Towards Learning Mathematics. International Journal of Emerging Technologies in Learning (Online), 18(14), 105.
- Rahman, A. (2022). Mapping the Efficacy of Artificial Intelligence-based Online Proctored Examination (OPE) in Higher Education during COVID-19: Evidence from Assam, India. International Journal of Learning, Teaching and Educational Research, 21(9), 76-94.
- Rezapour, M., &Elmshaeuser, S. K. (2022). Artificial intelligence-based analytics for impacts of COVID-19 and online learning on college students' mental health. PLoS One, 17(11), e0276767.
- Roy, R., Babakerkhell, M. D., Mukherjee, S., Pal, D., &Funilkul, S. (2022). Evaluating the intention for the adoption of artificial intelligence-based robots in the university to educate the students. IEEE Access, 10, 125666-125678.
- Sahai, S., Khattar, S., & Goel, R. (2021). Role of technology in using artificial intelligence to improve educational learning challenges with reference to India. In Handbook of Research on Teaching With Virtual Environments and AI (pp. 681-703). IGI Global.
- Saravanan, B., Shanmugam, K., &Jeevarathinam, N. (2021). Role of Artificial Intelligence in Remote Learning during COVID-19 Pandemic. Journal of Information Technology, 3(4), 307-319.
- Tang, K. Y., Chang, C. Y., & Hwang, G. J. (2023). Trends in artificial intelligence- supported elearning: A systematic review and co-citation network analysis (1998–2019). Interactive Learning Environments, 31(4), 2134-2152.
- Tanveer, M., Hassan, S., & Bhaumik, A. (2020). Academic policy regarding sustainability and artificial intelligence (AI). Sustainability, 12(22), 9435.

- Xia, Q., Chiu, T. K., Lee, M., Sanusi, I. T., Dai, Y., & Chai, C. S. (2022). A self- determination theory (SDT) design approach for inclusive and diverse artificial intelligence (AI) education. Computers & Education, 189, 104582.
- Xia, Q., Chiu, T. K., Zhou, X., Chai, C. S., & Cheng, M. (2022). Systematic literature review on opportunities, challenges, and future research recommendations of artificial intelligence in education. Computers and Education: Artificial Intelligence, 100118.
- Xu, W., Meng, J., Raja, S. K. S., Priya, M. P., & Kiruthiga Devi, M. (2023). Artificial intelligence in constructing personalized and accurate feedback systems for students. International Journal of Modeling, Simulation, and Scientific Computing, 14(01), 2341001.
- Zafari, M., Bazargani, J. S., Sadeghi-Niaraki, A., & Choi, S. M. (2022). Artificial intelligence applications in K-12 education: A systematic literature review. IEEE Access, 10, 61905-61921.
- Zhou, X., Yang, Z., Hyman, M. R., Li, G., & Munim, Z. H. (2022). Guest editorial: Impact of artificial intelligence on business strategy in emerging markets: a conceptual framework and future research directions. International Journal of Emerging Markets, 17(4), 917-929.

******