

AI(Artificial Intelligence) Integration in Education: Teachers' Perspectives, Professional Development and Policy Recommendations

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ABSTRACT

Artificial Intelligence (AI) has emerged as a disruptive and transformative force in education as it offers potential benefits such as personalized learning, effective assessment methodologies, and automated administrative processes. This study examines the teachers' perspectives on AI integration in education, reflecting on their perceptions, prevalent challenges, and professional development practices required to empower the teachers with technical skills to ensure effective implementation of AI. A questionnaire was prepared, validated, and used to collect data from the teachers about their awareness and readiness to adopt emerging technologies such as AI, AR, and VR. Some open-ended questions were added to collect information regarding the challenges faced and supportive measures required for AI integration in Education.

The research reveals that the majority of teachers reflected a positive attitude toward AI integration. Many educators realize that AI can fill quality gaps in education by making learning experiences more enriching, and student-centered, and enhancing assessment practice. Teachers also appreciate AI in terms of alleviating their burden and making the teaching-learning process student-centric. However, the report highlights major challenges faced by teachers in integrating AI in Education, including limited accessibility to AI-based resources, lack of training, ethical concerns, and data privacy. Concerns regarding resistance to change and infrastructure constraints complicate AI integration further. The study underscores the need for effective and professional training programs to equip and apprise teachers with the skills and confidence to integrate AI into teaching practices. Workshops, online courses, and hands-on training are preferred modes of professional development identified through the study. Moreover, Institutional policies must also align with the vision of NEP 2020 regarding AI in education. Policies also try to create friendly environments for using AI, reducing infrastructural bottlenecks or gaps, establishing ethical use guidelines, and involving teachers in processes of decision-making.

This research has also emphasized the role of teachers in realizing AI's potential and advocating for effective strategies needed to overcome challenges associated with AI Integration. By empowering teachers through adequate training and resources, the education sector can harness the power of AI to create an inclusive, effective, and future-ready learning environment.

Keywords: Artificial Intelligence, Education, Professional Development, NEP 2020.

1. Introduction

AI devices are smart systems that process information, make decisions, and solve problems in a way similar to how humans think and behave. AI-based devices can learn from experience and data without being explicitly programmed, in contrast to devices for general computing. (Krstić et al., 2022) Unlike general computing devices, AI-based devices can learn from experience and existing data without requiring explicit programming. A paradigm shift in the field of education has been catalyzed by artificial intelligence (AI) in an era of unparalleled technical developments.(Karaca & Kilcan, 2023). No nation can escape the effects of technological breakthroughs, which have a profound effect. However, the results of technology can be greatly influenced by how it is accepted and incorporated into society.(Srivastava ,2018). Artificial intelligence (AI) is transforming several industries including education with

better learning outcomes, automated administrative tasks, and data-driven insights. AI-enabled tools like virtual assistants, intelligent tutoring programs, and adaptive learning platforms can personalize education and enhance its effectiveness and accessibility. AI's adoption in education is expected to enhance teaching and learning processes and close quality gaps with further development. AI can also be used to create virtual classrooms for distance learning. AI-powered chatbots can also be used to provide personalized guidance to students. (Malik et al., 2018).

AI integration in school education has gained significant attention due to its potential to transform pedagogical practices. AI aims at creating intelligent devices that can handle even challenging jobs, that makes them pertinent for the education sector. There is no denying AI's revolutionary potential in education (Fullan et al., 2023)

With AI tools, teachers can deliver real-time feedback, automate grading, and tailor teaching to individual students. Schools are integrating AI into curricula to enhance digital literacy and problem-solving skills. There are also some downsides to integrating AI into classrooms, including resource availability, teacher preparedness, and ethical considerations. AI is very important in different areas, and when it is implemented in education, it can make huge difference. Some of the impactful prospects of AI implementation include:

- Personalized tutoring and self-paced learning
- Creation of e-content
- Extended support for administrative tasks.
- AI-based expert Devices
- Designing remedial teaching modules
- Supporting Multilingualism in Teaching

AI implementation in educational institutions has seen much interest, as it could revolutionize the way pedagogical practices are carried out. AI-based platforms assist educators in personalizing instruction methods to match individual students, provide instant feedback, and allow grading systems to be automated. Schools across the globe are adding AI to syllabi to sharpen problem-solving capacities and digital literacies. Nonetheless, the incorporation of AI into education in schools is not without challenges, which include the Digital divide, teacher training, availability of resources, and ethical issues.

Recommendations of NEP 2020 for AI Integration in Education

The National Education Policy (NEP) 2020 recognizes the transformative role of AI and emerging technologies in education.

- To introduce contemporary subjects such as Artificial Intelligence (AI), Design Thinking, and Global Citizenship Education (GCED) into the curriculum is a step in the right direction for developing important skills in students.
- To create a conducive policy environment that encourages the adoption of disruptive technologies in the education sector.
- To integrate Artificial Intelligence (AI) to fill the quality gap in Education by applying modern and technically advanced methods in Teaching, learning, and assessment.
- To use Artificial Intelligence (AI) to enhance the teaching-learning process by providing personalized learning experiences to students.
- To introduce digital assessments to assess and track the learning outcomes of students.
- To develop and integrate innovative technologies such as Augmented Reality (AR) and Virtual Reality (VR) into the educational system.
- To develop an effective educational technology ecosystem that is compatible with existing infrastructure.
- To use robotics and automation to improve the efficiency of educational processes.
- To leverage data analytics and data-driven decision-making to improve the quality of education
- To encourage partnerships and collaborations between educational institutions and technology companies.

2. Literature Review

Several research papers point to the contribution of AI towards improved learning outcomes, increasing student participation, and simplifying administrative tasks. Researchers have also analyzed how AI affects adaptive learning, education analytics, and its ethics. Research also points out teacher training initiatives to ease effective integration of AI.

Popenici & Kerr (2017) studied the impact of AI in Teaching-Learning and reflected that AI can also help teachers grade assignments and give students immediate feedback. AI can support fairness in the learning process, uphold academic integrity, and can even identify instances of cheating. A study by **Luckin et al. (2018)** emphasizes that AI-enhanced learning environments can increase individualized education and meet the needs of individual students.

According to the study conducted by **Malik et al. (2018)**, several tedious operations, like grading tests, giving tailored comments, and forecasting student success, have been automated with the aid of AI. Teachers may now create virtual classrooms and give pupils individualized learning experiences. **Holmes et al. (2019)** have discussed the ethical issues surrounding AI in education, such as data privacy and prejudice in AI-driven decision-making.

Studies indicate that although AI can aid in education reforms, its effectiveness relies on teachers' preparedness and institutional readiness. According to the study conducted by **Alam(2021)**, it is necessary to understand educators' point about Technical integration. Given their critical role in influencing the educational landscape for the next generations, it is imperative to understand educators' opinions on AI in the teaching and learning process.

According to Selwyn (2021), AI Integration in education must be complemented by teacher training and supportive policies to maximize its potential impact.

A study conducted by **Celik et al.(2022)** reflects upon the promises and challenges of Artificial Intelligence for Teachers. To integrate AI effectively in Education, teachers can attend seminars and workshops to gain an understanding of the implications and potential of AI-based teaching. Furthermore, they can participate in online courses and webinars to build their AI literacy.

3. Objectives of Research

This study aims to explore teachers' perspectives towards AI implementation in education, gauge their preparedness to use AI-based tools, and determine training needs. The study further attempts to determine the extent of congruence between AI implementation and NEP 2020 suggestions and to establish major impediments to successful implementation.

4. Research Questions

This study attempts to understand teachers' attitudes towards AI implementation in education through the following research questions:

- What are teachers' perceptions of AI integration in school education?
- How familiar are teachers with AI tools and technologies?
- What are the major benefits teachers associate with AI in education?
- How aligned are current AI adoption practices with NEP 2020 recommendations?
- What challenges do teachers face in implementing AI in their classrooms?
- How well do existing teacher training programs prepare educators for AI integration?
- What are teachers' expectations regarding professional development opportunities for AI integration?
- What infrastructural and policy-level improvements are needed to facilitate AI adoption in education?

5. Methodology

The study uses a mixed-method design integrating approaches of qualitative and quantitative data collection methods. A structured questionnaire was employed as the main tool for data collection to elicit information from teachers on their opinion about AI integration in education, its perceived advantages, and their readiness for the same. The questionnaire was shared with secondary school Teachers of government and private schools from all Zones. A total of 220 teachers (80 from government and 140 from private

schools) responded to the questionnaire. The responses were statistically analyzed to derive meaningful insights. Some open-ended questions were added to collect information regarding the challenges faced by the teachers in AI integration. Moreover, their suggestions and recommendations for further improvements and strategic planning have been gathered through the questionnaire.

6. Data Analysis

The data were analyzed using statistical tools to interpret teachers' perspectives on AI integration. Both descriptive and inferential statistical methods have been utilized to gain insights into Teachers' perceptions of AI integration in Education and the challenges associated with it. Collected responses were compiled using descriptive statistics, such as frequency counts and percentages, which highlighted patterns in familiarity, perceived benefits, difficulties, and training requirements. To evaluate general response patterns among teachers in public and private schools, measure of central tendency, such as the mean, was computed. Furthermore, the variety in responses was ascertained using the standard deviation, reflecting how consistently teachers' viewpoints were held. The t-test was also employed to compare the means of government and private school teachers' responses to various aspects of AI integration. To successfully integrate AI in education, these statistical tools assisted in identifying important areas that need professional development programs and policy interventions.

Tabular representation of responses:

Response area	Gov_Res ponse_C ount	Gov_Perc entage	Gov_Mea n	Gov_Std_ Dev	Pvt_Res onse_Co unt	Pvt_Perc entage	Pvt_Mea n	Pvt_Std_ Dev
Familiarity with AI	52	65	3.5	1.5	112	80	3.8	1.2
AI can complement teaching	60	75	3.8	1.3	125	89	4.1	1.1
Used AI-based tools	45	56	3.2	1.6	110	79	3.6	1.3
AI benefits - Personalized Learning	65	81	4.1	1.2	120	86	4.3	1
AI benefits - Assessment & Evaluation	55	69	3.7	1.4	118	84	4	1.1
AI benefits - Administrative Tasks	50	63	3.5	1.3	105	75	3.8	1.2
Concerns - Ethical Issues	40	50	2.9	1.7	95	68	3.2	1.4
Concerns - Data Privacy	45	56	3.1	1.5	102	73	3.5	1.3
Concerns - Reduced Autonomy	30	38	2.5	1.8	80	57	2.8	1.5
Concerns - Lack of Training	55	69	3.7	1.4	115	82	4	1.1
Concerns - Over-reliance on Tech	35	44	2.8	1.6	90	64	3	1.3
AI addresses quality gap (Agree)	50	63	3.6	1.3	120	86	4.1	1
AI enhances personalized learning (Effective)	58	73	3.9	1.2	125	89	4.3	1.1
Digital assessments effectiveness (Effective)	53	66	3.7	1.3	118	84	4	1.2
Challenges - Cost & Resource Constraints	56	70	3.8	1.3	110	79	3.9	1.2
Challenges - Resistance to Change	40	50	3.2	1.5	90	64	3.4	1.3
Challenges - Lack of Training	60	75	3.9	1.2	122	87	4.2	1.1
Challenges - Technical Issues	48	60	3.5	1.4	108	77	3.8	1.2
Challenges - Student Adaptability	35	44	3	1.6	85	61	3.3	1.4
Preferred Training - Workshops	62	78	4	1.1	125	89	4.4	1
Preferred Training - Online Courses	50	63	3.7	1.3	115	82	4	1.1
Preferred Training - Hands-on Training	55	69	3.8	1.2	118	84	4.1	1.1
Preferred Training - Collaboration	48	60	3.6	1.4	108	77	3.9	1.2

Table 1(Percentage, mean and Standard Deviation)

7. Findings

I. Results & Discussions

1. Teachers' Familiarity with AI

- **Government School Teachers:** 65% of respondents reported being familiar with AI, with a mean score of **3.5** and a standard deviation of **1.5**.

- **Private School Teachers:** 80% indicated familiarity, with a mean score of **3.8** and a standard deviation of **1.2**.

2. AI's Role in Complementing Teaching

- **Government Teachers:** 75% agreed AI can complement their teaching (mean = **3.8**, SD = **1.3**).
- **Private Teachers:** 89% shared this belief (mean = **4.1**, SD = **1.1**).

3. Usage of AI-Based Tools

- **Government Teachers:** 56% have used AI-based tools (mean = **3.2**, SD = **1.6**).
- **Private Teachers:** 79% have incorporated AI tools into teaching (mean = **3.6**, SD = **1.3**).

4. AI Benefits in Education

Teachers recognized multiple areas where AI could contribute:

- **Personalized Learning:** 81% (Gov.) and 86%(Pvt.), (Gov: **4.1**, Pvt: **4.3**).
- **Assessment & Evaluation:** 69% (Gov.) and 84%(Pvt.), (Gov: **3.7**, Pvt: **4.0**).
- **Administrative Tasks:** 63% (Gov.) and 75%(Pvt.), (Gov: **3.5**, Pvt: **3.8**).

5. Challenges Associated with AI Integration

Teachers identified several barriers:

- **Ethical Issues:** 50%(Gov.) and 68%(Pvt.), (Gov: **2.9**, Pvt: **3.2**).
- **Data Privacy:** 56%(Gov.) and 73%(Pvt.), (Gov: **3.1**, Pvt: **3.5**).
- **Lack of Training:** 69% (Gov.)and 82% (Pvt.)(Gov: **3.7**, Pvt: **4.0**).
- **Over-reliance on Technology:** 44% (Gov.)and 64%(Pvt.), (Gov: **2.8**, Pvt: **3.0**).

6. AI in Addressing Educational Gaps

- **Government Teachers:** 63% believe AI can address educational quality gaps (mean = **3.6**, SD = **1.3**).
- **Private Teachers:** 86% agree with this (mean = **4.1**, SD = **1**).

7. Preferred Training Methods for AI Adoption

Teachers indicated their preferred professional development methods:

- **Workshops:** 78%(Gov.)and 89%(Pvt.) (Gov: **4**, Pvt: **4.4**).
- **Online Courses:** 63%(Gov.)and 82%(Pvt.) (Gov: **3.7**, Pvt: **4.0**).
- **Hands-on Training:** 69%(Gov.)and 84%(Pvt.) (Gov: **3.6**, Pvt: **4.1**).
- **Collaboration Among Educators:** 60%(Gov.)and 77%(Pvt.) (Gov: **3.6**, Pvt: **3.9**).

75% of private school teachers and 68% of government school teachers emphasized the need for structured AI training programs, with a preference for workshops and online certification courses. As far as alignment to NEP is concerned, 55% of government school educators and 65% of private school teachers felt that current AI adoption in schools was partially aligned with NEP 2020 recommendations, with gaps in infrastructure and training.

Tabular Representation of Comparison of Mean scores of Government and Private school Teachers

Response Area	Gov $\bar{x}$	Pvt $\bar{x}$	N (Gov)	N (Pvt)	t-statistic	df	p-value	Significance
Familiarity with AI	3.5	3.8	80	140	-1.53	218	0.128	Not Significant
AI can complement teaching	3.8	4.1	80	140	-1.74	218	0.084	Not Significant
Used AI-based tools	3.2	3.6	80	140	-1.91	218	0.059	Not Significant
AI benefits - Personalized Learning	4.1	4.3	80	140	-1.26	218	0.209	Not Significant
AI benefits - Assessment & Evaluation	3.7	3.8	80	140	-0.55	218	0.584	Not Significant

Table 2 (t-static)

The comparison of means between government and private school teachers for different response areas shows that none of the differences are statistically significant at the 0.05 level. This indicates no significant difference between government and Private school teachers concerning their familiarity and usage of AI tools and the perceived benefits of AI integration in personalized learning, assessment and evaluation.

8. Analysis and Interpretation

- Private school teachers exhibit slightly higher familiarity with AI as compared to government school teachers, as reflected in their higher mean score and lower variability.
- Majority of teachers acknowledge AI's role in enhancing instructional effectiveness, with private school teachers showing slightly higher agreement to the same.
- The adoption of AI-based tools is more prevalent in private schools (better infrastructure and access to technology could be the valid reason for the same)
- The highest perceived benefit of AI is found as personalized learning, with private school teachers rating it slightly higher than government school teachers.
- Concerns about data privacy and lack of training are prominent, with private school teachers showing slightly higher concerns about data privacy, while government teachers report higher concerns about lack of training.
- Private school teachers strongly agree on AI's potential to bridge educational quality gaps (greater exposure to AI-based tools and labs could be the possible reason).
- Teachers favour workshops and hands-on training to improve AI proficiency, with a higher preference for online courses over collaborations.
- Majority of Teachers from both sectors consider that current AI adoption in schools is partially aligned with NEP 2020 recommendations, with gaps in infrastructure and training.
- The statistical analysis shows that there are no significant differences in responses between government and private school teachers, suggesting a generally uniform perspective on AI integration in education.

9. Recommendations

I. Recommendations based on Qualitative feedback from Teachers

Feedback collected from Teachers through open-ended questions that provide qualitative insights into their concerns, expectations, and real-world challenges in concern to AI integration in education:

- Development of AI-based Teacher training Programmes.
- Availability of Training modules on AI on Technology Platforms(SWAYAM, DIKSHA, etc.)
- Curriculum Integration
- Collaboration and knowledge Sharing.
- Expert sessions and capacity building Programme

- AI-Powered grading and feedback system to improve efficiency and reduce workload.

II. Research-based Recommendations

- Improvement in Infrastructure and accessibility.
- Extending opportunities for AI-Focused Teacher Training Programmes.
- Policy-level interventions for AI integration in education in alignment with NEP 2020.
- Enhancing Data Privacy and Ethical Awareness
- Addressing ethical and Privacy concerns.
- Ensuring government and Institutional support.

10. Conclusion

NEP 2020 has emphasized leveraging Technology in Education, including the use of disruptive Technology such as AI (Artificial Intelligence), VR/AR, IoT, Robotics etc. The integration of AI in education can pave the way for significant opportunities to enhance teaching and learning experiences. AI has the potential to substantially impact the development of inclusive, efficient, and future-ready learning environments if educators are provided with the required infrastructure, tools, and training. AI and related technologies are increasingly shaping the world we live in and students need to have a foundational understanding of these technologies and their potential applications. Automated grading systems, content creation, AI-enabled audio-visual aids, Natural language Processing, AI-based Expert systems, and LMS (Learning Management Systems) are some of the major technological advancements in the field of Education.

This study reveals a positive attitude among teachers toward integrating AI in education in both the government and Private sector. Teachers consider AI as a prominent source to personalize learning and to improve assessment strategies. The majority of teachers expressed the need for Professional Development Programmes and hands-on training sessions for enhancing their awareness of AI and its effective implementation in education. This will help them to understand the implications of AI and be prepared to use it responsibly and ethically. The study has reflected on various challenges in AI integration in education. Inadequate resources, ethical concerns, data privacy issues, and resistance to change have been identified as some of the major roadblocks in the way of implementing AI. This study reveals that the effective application of AI requires support from Educational institutions, policymakers, and administration. Moreover, preparing teachers for AI-powered education is a crucial aspect of ensuring the successful integration of AI in education, and it requires the collaboration of educators, educational administrators, technology experts, and policy makers and the implementation of AI in education is required to be aligned with NEP 2020 guidelines.

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