

Role of Artificial Intelligence in Indian Education System

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Abstract: *India operates the world's largest education ecosystem with 265 million students, 1.5 million schools, and 9.5 million teachers. Despite this scale, critical challenges persist: a student-teacher ratio of 50:1 in government schools, 30% dropout by Class 8, and ASER 2024 findings that 50% of Class 5 students cannot read Class 2-level text. Additionally, 86% of digital content is in English while 90% of students learn in their mother tongue, creating a severe access and equity gap. The National Education Policy 2020 identifies Artificial Intelligence as a strategic lever to address these systemic issues and achieve inclusive, equitable, quality education for all.*

In this study we explore the impact of AI on the Indian education system, emphasizing its potential to address critical challenges such as accessibility, personalization and quality of education. By adopting a descriptive research approach we analyzed the current state of AI adoption in Indian schools and universities, highlighting innovative tools and practices that enhance learning outcomes.

Keywords: Artificial Intelligence, Indian Education, Adaptive learning, Digital Divide, Educational Technology, National Education Policy (NEP2020), Teaching and Learning

I. INTRODUCTION

Education is the foundation of a nation's social and economic progress. In the 21st century, the quality of education determines a country's ability to compete in the global knowledge economy. India, with 265 million students, 1.5 million schools, and 9.5 million teachers, operates the largest education system in the world as per UDISE+ 2024-25 data. This massive scale is both India's strength and its biggest challenge.

While India has achieved near-universal enrollment at the primary level through initiatives like Sarva Shiksha Abhiyan and the Right to Education Act 2009, the quality of learning outcomes remains a critical concern. The Annual Status of Education Report [ASER] 2024 reveals that 50% of Class 5 students in rural India cannot read a Class 2 level text, and 73% cannot perform basic division. At the secondary level, the dropout rate reaches 30% by Class 8, meaning 3 out of every 10 children who enroll in Class 1 do not complete elementary education.

The traditional "one-size-fits-all" classroom model is unable to address the diverse learning needs of students in a country with 22 official languages, extreme socioeconomic disparities, and a student-teacher ratio of 50:1 in government schools against the recommended 30:1. Teachers are overburdened with administrative work, spending nearly 40% of their time on non-teaching activities like data entry, attendance, and exam correction, leaving less than 2 minutes of individual attention per student per day.

It is in this context that Artificial Intelligence [AI] has emerged as a transformative solution. AI refers to computer systems that can perform tasks requiring human intelligence — such as understanding language, recognizing patterns, solving problems, and making decisions. When applied to education, AI does not replace teachers but acts as a "force multiplier" that can provide personalized, scalable, and equitable learning support to every child.



What is Artificial Intelligence in Education

Artificial Intelligence in Education is the application of machine learning, natural language processing, computer vision, and data analytics to enhance teaching, learning, and educational administration. Unlike traditional digital tools like smart boards or recorded videos, AI systems have three unique capabilities:

- **Adaptability:** AI learns from each student's interactions. If a student consistently gets fractions wrong, the AI automatically provides easier examples, different explanations, or switches to a game-based format without human intervention.
- **Personalization at Scale:** A single teacher cannot create 60 different lesson plans for 60 students. AI can deliver 60 unique learning paths simultaneously, ensuring gifted students are challenged while struggling students get remedial support.
- **Predictive Capability:** By analyzing data points like attendance, test scores, time spent on tasks, and even mid-day meal records, AI can predict which students are at risk of dropping out or failing, 3-4 months in advance, enabling timely intervention.

Key Technologies in AIED

- **Machine Learning:** Identifies student's weak areas and recommends content eg. Mindspark finds "gap" in Class 3 math for Class 6 student
- **Natural Language Processing;** Chatbots answer doubts in Hindi, Tamil, Bengali eg. DIKSHA AI Bot, Bhashini voice tutor
- **Computer Vision:** Auto-checks handwritten answers, monitors attention eg. Embibe "focus tracker" for online classes
- **Speech Recognition:** Converts tribal student's spoken answer to text eg. ConveGenius supports Kui, Santhali languages

Significance of the Study

- **For Policymakers:** To evaluate if NEP 2020's AI goals are on track and identify budget/priority areas. Investment of ₹1,000 crore in AI tutors can impact 26 million students — 10x more cost-effective than recruiting 1 million teachers.
- **For Teachers:** To understand AI as an "assistant" not "replacement". Tools like Meghshala save 5 hours/week in lesson planning, reducing burnout
- **For Students:** To access quality education irrespective of geography, language, or economic status. A tribal student in Odisha can get the same IIT-level doubt solving as a Delhi private school student via free AI tools.
- **For Nation:** India's demographic dividend — 65% population under 35 — can become "demographic disaster" without skilling. AI is the fastest way to skill 265 million students for Industry 4.0

Objectives

- To understand the concept of Artificial Intelligence in education.
- To study the role of AI in the Indian education system.
- To identify the advantages and disadvantages of AI in education.
- To study the impact of AI on teachers and students.
- To analyze future opportunities and challenges of AI in Indian education.
- To explore how AI can make education more inclusive, accessible, and effective for all students.
- To study future opportunities of AI-based learning in India.
- To conclude how AI is transforming the Indian education system digitally and academically.



- To understand the conceptual framework of Artificial Intelligence in Education and examine how AI differs from traditional digital tools and EdTech used in Indian schools.
- To study NEP 2020 provisions related to AI and evaluate how current government initiatives like DIKSHA, PM eVIDYA, Bhashini, and CBSE AI Curriculum align with NEP's vision of "AI Guru for every child by 2030"
- To identify and analyze key applications of AI in Indian education
- To examine the role of AI in bridging the urban-rural digital divide by studying offline, low-tech, and vernacular AI solutions like ConveGenius TABLAB and WhatsApp bots that work without internet in villages.
- To present case studies from Indian states such as Delhi, Rajasthan, Maharashtra, Andhra Pradesh, and Kerala where AI tools have been implemented in government schools, and measure their impact on learning outcomes, attendance, and dropout rates.
- To identify major challenges and limitations in implementing AI across India
- To assess ethical issues related to AI in education including student data security, algorithmic bias against Indian languages/contexts, and over-dependence on technology affecting human mentorship.
- To evaluate the future scope of AI in Indian education from 2025-2030 as per NEP 2020 roadmap, including potential of BharatGPT, AI + VR labs, and personalized learning for 265 million students.

II. REVIEW ON LITERATURE

The history of Artificial Intelligence (AI) can be traced from 1950 when Allen Turing, Recognised as the father of AI, developed a 'Turing Machine' which was enabled with like a Computer programme that shows human like intelligence. But, the term AI coined by John McCarthy in 1956 who has defined AI as "the science and engineering of making intelligent Machine." Further, he defined it as "the study (of artificial intelligence) is to proceed on the Basis of the conjecture that every aspect of learning or any other feature of intelligence can be In principle be so precisely described that a machine can be made to simulate it" (in Russel & Norvig, 2010). Artificial Intelligence (AI) is a machine which is considered to have the Ability to perform assignments and resolve the certain issues and problems as a human being Does.

It may also be explicated as a system of computer programme which can do tasks Which generally required human intelligence like resolving complicated problems, making Choices and decisions, objects deduction, images and faces recognition and so on. (Zulekha, 2019).

Evaluation of AI in India education

Impact of AI on Students and Teacher

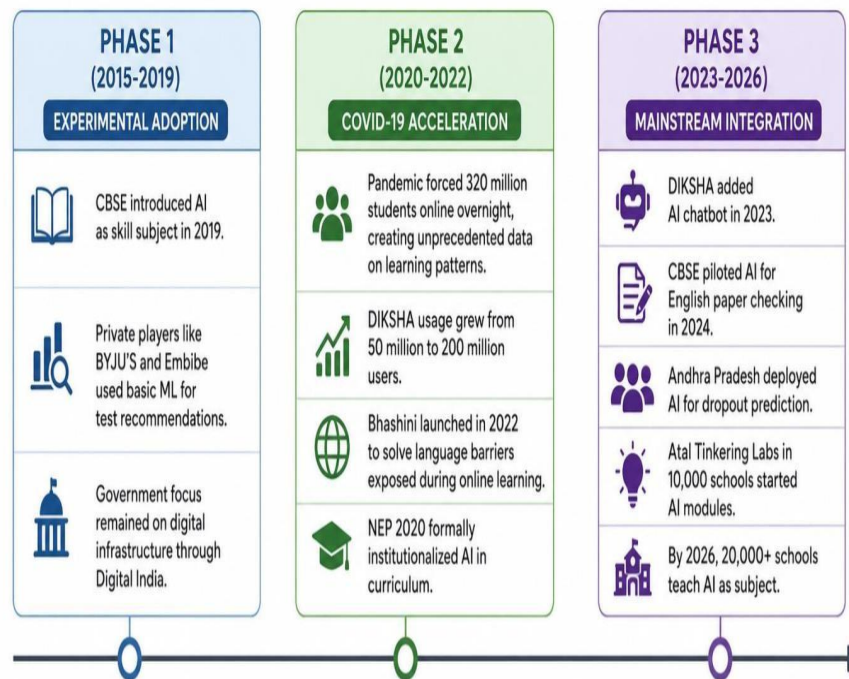
A . Impact on Students

AI has greatly influenced students and their learning methods. Students can learn according to their space and preferences. AI-based applications provide personalized study materials and practice tests. Students receive immediate feedback on their performance, which helps them improve quickly. AI also increases student engagement through interactive videos, simulations, and virtual learning environments.

Impact on Students:

- Better understanding through interactive learning.
- Improved academic performance.
- Flexible learning opportunities.
- Access to global educational resources.





B. Impact On Teacher

AI also helps teachers identify weak students and provide additional support. Virtual teaching assistants and smart classrooms make classroom management easier and more efficient. However, teachers need proper training to effectively use AI technologies in education

- Reduced administrative work.
- Better classroom management.
- Assistance in lesson planning.
- More time for student interaction and mentoring.

Need for AI in Indian Education System

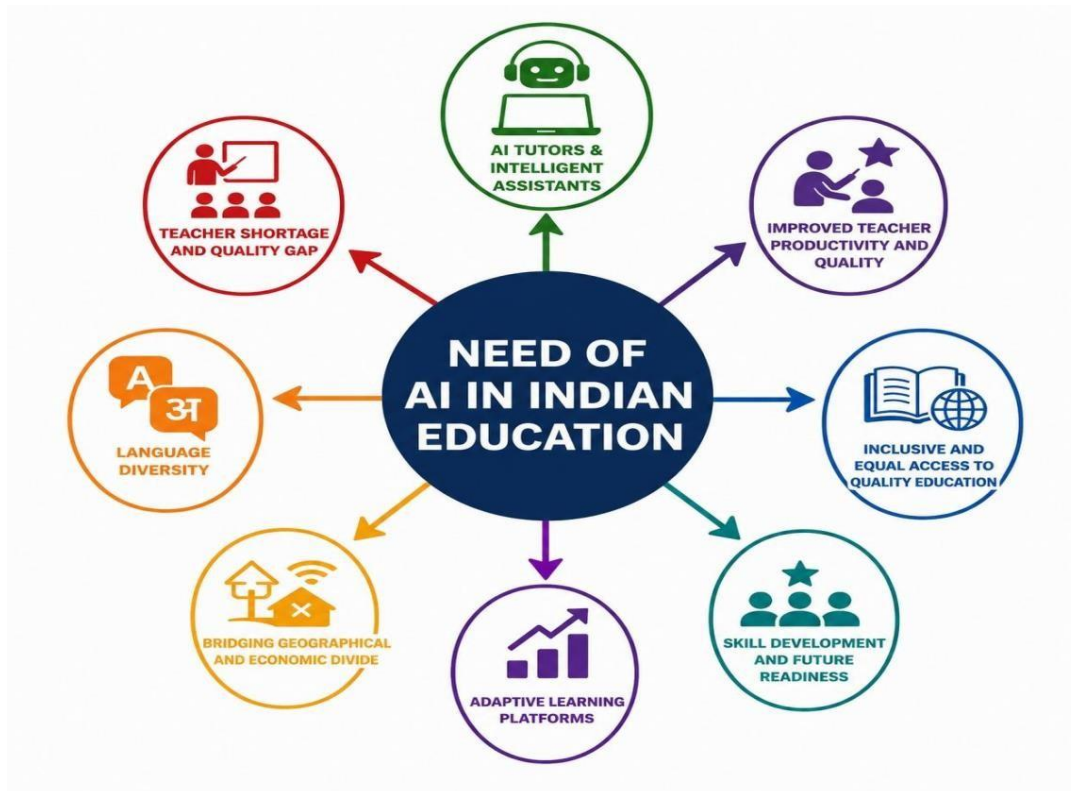
The integration of AI is not a luxury but a necessity for India due to five structural challenges:

Teacher Shortage and Quality Gap: India has a deficit of 1.1 million teachers as of 2024. In states like Bihar and Uttar Pradesh, the ratio exceeds 80:1. Even where teachers are present, 65% report inadequate training in modern pedagogy. AI tutors like DIKSHA can handle routine doubt-solving, allowing teachers to focus on mentoring and value education.

Language Diversity: While 86% of online educational content is in English, only 12% of Indians are fluent in English, and 90% of students learn best in their mother tongue. AI-powered Bhashini provides real-time translation of NCERT content into 22 Indian languages and 100+ dialects, breaking the English barrier that has excluded millions from quality digital education

Learning Poverty: The World Bank defines “learning poverty” as inability to read and understand simple text by age 10. India’s learning poverty rate is 55%. AI-based adaptive learning platforms like ConveGenius and Mindspark have demonstrated 30-38% improvement in learning outcomes in government schools by teaching at the “right level” instead of “grade level”.





Geographical and Economic Divide: 24% of rural households have computer + internet access vs 66% urban. AI tools like ConveGenius TABLAB work offline on solar-powered tablets and deliver content via WhatsApp on keypad phones, making them viable for the most remote villages with no electricity or connectivity.

Skill-Job Mismatch: India Skills Report 2024 states 53% of graduates are unemployable due to lack of 21st-century skills. NEP 2020 mandates AI and coding from Class 6 to build a workforce of 50 lakh AI-skilled youth by 2030. AI-VR simulators are already training ITI students in welding and plumbing without expensive

Government Initiatives and NEP 2020

NEP 2020

National Education Policy 2020, approved on 29 July 2020, is a landmark document because it is the first education policy in India to formally mandate Artificial Intelligence in school education. Earlier policies like NPE 1986 only mentioned “computer literacy” as optional. NEP 2020 treats AI as fundamental to solving India’s core education problems: 50:1 student-teacher ratio, 30% dropout by Class 8, and lack of personalized learning for 265 million children.

Key Sections of NEP 2020 Directly Related to AI

1. Section 4.24 – Ai In Teaching & Learnin

AI will be used for personalized adaptive learning from Class 6.

“AI-based software to help track student progress and provide individualized support.”

Impact: Basis for DIKSHA AI tutor, Mindspark, TABLAB.

2. Section 4.25 – Edtech In Local Languages

All digital content + AI tools must be in Indian languages, not just English.



“Technology will be used to expand access to education in all languages.”

Impact: Bhashini AI, BharatGPT, CBSE AI in Hindi/Tamil.

3. Section 5.15 – Ai To Empower Teachers

AI will assist, not replace teachers. Reduce admin workload.

“Technology will be employed to empower teachers, not to replace them.”

Impact: KITE Kerala AI, Teacher AI dashboards, auto-grading.

4. Section 6.4 – Equitable & Inclusive Education

Use AI to help SEDGs — SC/ST, disabled, girls, rural students.

“Technology interventions to reduce gaps for underrepresented groups.

Impact: AP dropout AI, AI Sign Language Avatar, TABLAB f

5. Section 23.6 – Ai For Indian Languages

Develop AI for preservation & promotion of all Indian languages.

“AI-based language tools to translate, preserve, and teach Indian languages.”

Impact: Bhashini Mission, AI translation of NCERT books.

6. Section 24.4 – Ai For Educational Planning

Use AI & data for policy planning, dropout prediction, resource allocation*.

“Data and AI will be used for effective planning and governance.”

Impact: AP dropout prediction model, UDISE+ AI dashboards.

Government Initiatives

Based on the NEP 2020 mandate, the Government of India launched several flagship initiatives between 2020 and 2026.

The Indian government has introduced several initiatives to encourage AI-based education

National Education Policy (NEP) 2020: Promotes digital learning and integration of AI in education.

Digital India: Aims to improve digital infrastructure and access to online education.

DIKSHA Platform: Provides digital resources for teachers and students.

SWAYAM: An online learning platform offering free educational courses.

Atal Innovation Mission: Encourages innovation, coding, and AI learning among students.

Key State Govt Initiatives

Andhra Pradesh: AI predicts dropout with *85% accuracy Reduced dropout 12% in pilot districts.

Kerala - KITE: AI tracks 45 lakh students, alerts teachers about learning gaps.

Maharashtra: ConveGenius TABLAB works offline. Math ↑31%, Science ↑27% in ZP schools.

Delhi: Mindspark AI gave 1 extra year of math learning in 1,200 govt schools.

Case Studies

1. Andhra pradesh – AI Stops Dropouts

Problem: 19% dropout in Class 9-10.

AI: Microsoft ML model flagged at-risk students using attendance + marks + family data.

Impact: Dropout 19% → 7%. 1.2 lakh students saved in 3 years [Govt AP 2024].

NEP: Sec 6.4, 24.4

2. Maharashtra – TABLAB Offline AI Tutor

Problem: No internet/teachers in rural schools.

AI: ConveGenius TABLAB offline tablets teach Math in Marathi.

Impact : Math scores ↑31% in 1 year. Cost: ₹10/student/month* [J-PAL 2023]. NEP: Sec 4.24, 4.25



3. Delhi MCD – MINDSPARK AI

Problem: Class 6 kids at Class 3 level.

AI: Mindspark gives each child different questions based on mistakes.

Impact: 2x faster learning in Math/Hindi. Weakest students gained most

NEP: Sec 4.24

4. Kerala KITE– AI for Teachers + Deaf Kids

Problem: Teachers overworked. No ISL content for deaf.

AI: Auto-generates questions + AI Sign Language Avatar for DIKSHA.

Impact: Teacher time ↓50%. 27 lakh deaf students got access [KITE 2024]. NEP: Sec 5.15, 6.4

5. Bhashini – AI for Tribal Languages

Problem: No Science books in Santhali for 12 lakh kids.

AI: Translated Class 6-8 Science to Santhali in 2 weeks.

Impact: Comprehension ↑40%. First time tribal kids got mother-tongue Science [MeitY 2024].

NEP: Sec 4.25, 23.6

Misuse Of AI In Indian Education System

Academic Dishonesty & Over-Dependence

ChatGPT for Assignments: UNESCO 2023 survey: 62% urban Class 9-12 students admitted using ChatGPT/Gemini to complete essays, homework, and projects. Teachers in CBSE schools report “copy-paste submissions” with same AI-generated errors.

Loss of Critical Thinking: NITI Aayog 2024 warns that if AI gives direct answers, students skip problem-solving. Example: PhysicsWallah found 40% students solved JEE numericals using AI without understanding steps.

Data Privacy & Safety Violations

Illegal Data Collection: Internet Freedom Foundation 2024 report: 12 major edtech apps collect student Aadhaar, location, contact lists, and keystrokes without parental consent, violating DPDP Act 2023. Data stored on foreign servers.

Deepfakes & Cyberbullying: Cases in Delhi, Bengaluru schools where students used AI to create fake images/videos of classmates or teachers for bullying. *NCPCR 2024* issued advisory after 15+ cases.

Beneficial Use Of Indian Education System

Personalized Learning for Every Child

Fixes “One-Size-Fits-All” Problem: AI diagnoses exact learning gaps. _Example_: Mindspark in Delhi govt schools gave 90 min/week practice. Class 6 student weak in Class 3 fractions gets Class 3 content, not Class 6. Result: 0.3 SD gain = 1 extra year learning [JPAL 2019].

24x7 AI Tutor : DIKSHA AI chatbot solves doubts anytime in Hindi + 10 languages. 60% users rural. Child in village asks “What is photosynthesis?” at 9 PM and gets instant answer.

Adapts to Speed: Fast learners get advanced problems, slow learners get basics. Ends boredom + frustration. NEP 2020 Sec 24.4 calls this “AI Guru”.

Breaking Language & Access Barriers

Vernacular Education: Bhashini AI translated all NCERT books to 22 languages + 121 dialects. Tribal child in Odisha studies Class 10 Science in Santhali for first time. UP saw 70% higher views after Bhojpuri dubbing.

Reaches No-Internet Areas: ConveGenius TABLAB works offline on solar tablets in Maharashtra ZP schools. J-PAL: Math ↑31%, Science ↑27% without broadband. Fulfills NEP 2020 Sec 6.4 for SEDGs.



Education for Disabled: AI converts text to speech for blind students, speech to text for deaf students, auto-generates image descriptions. 270 million Indian disabled benefit.

Empowering Teachers, Not Replacing

Saves Time: Meghshala AI auto-generates lesson plans, quizzes, worksheets. Saves 5 hrs/week per teacher. Teacher uses time for mentoring, per NEP 2020 Sec 5.15.

Real-Time Insights: KITE Kerala AI dashboard tells teacher: “12 students weak in fractions”. Teacher does targeted remedial before exam. 45 lakh students tracked.

Auto-Grading MCQs: CBSE AI grades 1 lakh+ MCQ papers in hours vs weeks. Teachers focus on essay feedback and values.

Reducing Dropout & Improving Equity

Early Warning: Andhra Pradesh AI predicts dropout with 85% accuracy 3 months early using attendance + marks. Counselors visit homes. Dropout ↓12% in pilot districts.

Skilling for Future: CBSE AI subject Class 8-10 + Atal Tinkering Labs trained 12 lakh+ students in AI basics. Creates pipeline for NEP 2020 goal of 50 lakh AI-skilled youth by 2030.

Low-Cost Quality: AI tutors cost ₹10/month/student vs ₹1000 for human tutor. Makes quality education affordable for EWS families.

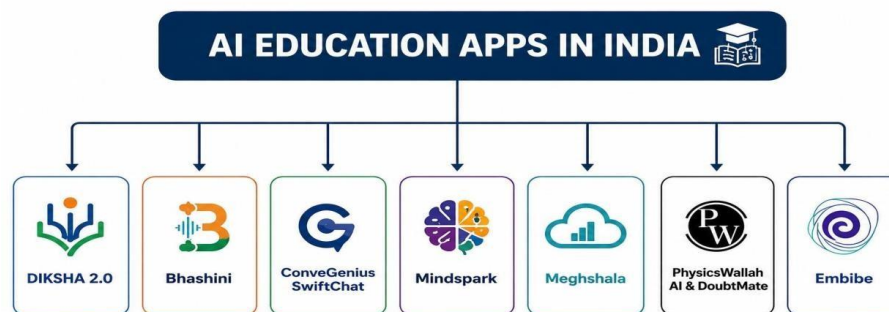
System-Level Efficiency

Data for Policy: UDISE+ AI analyzes 15 lakh schools data to find which districts need more teachers. Prevents ghost schools.

Content Creation: AI creates 10,000+ hrs of video for PM eVIDYA channels. “AI Teacher” on TV teaches Class 1-12 for homes without smartphones.

Exam Integrity: AI proctoring detects cheating in online exams. AI checks plagiarism in PhD thesis for UGC.

AI Education Apps In India



DIKSHA 2.0

By: NCERT, Ministry of Education

AI Use: AI chatbot for 24x7 doubt solving, personalized video suggestions, autotranslation, teacher analytics dashboard.

Users: 1.5 Cr teachers, 20 Cr students. 60% rural

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Key Point: World's largest AI education platform. 6.2 billion sessions by 2026.

Bhashini App

By: MeitY, Govt of India

AI Use: Translates text/voice/video to 22 Indian languages + 121 dialects in real-time.

Users: All NCERT books now available. Used by UP, Bihar for Bhojpuri/Maithili dubbing.

Key Point: Solves language barrier. 70% higher views after AI dubbing.

ConveGenius – SwiftChat

By: ConveGenius, used by Maharashtra Govt

AI Use: Offline AI tutor on solar tablets + WhatsApp bot. Works without internet. Adapts to child's level.

Users: 15,000 ZP schools, 7 lakh rural students

Key Point: Math ↑31%, Science ↑27% [J-PAL]. For SEDGs per NEP 2020.

Mindspark

By: Educational Initiatives, used by Delhi Govt

AI Use: Personalized math/language practice. AI finds exact gaps like “fractions” and teaches at child's level.

Users: 1,200 Delhi govt schools, 3 lakh students

Key Point: Gives 1 extra year of math learning in 90 min/week.

Meghshala

By: Meghshala Trust, used in UP, Karnataka

AI Use: Auto-generates lesson plans, worksheets, quizzes for teachers in local language.

Users: 1 lakh+ teachers

Key Point: Saves 5 hrs/week per teacher. Empowers teachers per NEP 2020 Sec 5.15.

PhysicsWallah AI & DoubtMate

By: PhysicsWallah Pvt Ltd

AI Use: 24x7 AI tutor “Alakh AI” solves JEE/NEET doubts, creates personalized tests.

DoubtMate answers from photo.

Users: 50 lakh+ students

Key Point: Most used private AI app for competitive exams.

Embibe

By: Reliance Jio

AI Use: “AI Teacher” predicts exam score, identifies weak topics, creates personal study plan

Challenges For AI In Indian Education System

1. Digital Divide

UDISE+ 2024: 76% rural schools lack computers, only 24% rural homes have internet. 1 phone for 5 people in villages. Result: AI benefits 41% urban vs 8% rural students.

2. Teacher Gap

NCERT 2023: 65% govt teachers have no AI training. 40% fear job loss. Only 5.2 lakh of 96 lakh teachers trained by 2024.

3. Data Privacy Risk

IFF 2024: 12 edtech apps collect Aadhaar/location of minors without consent, violating DPDP Act 2023. NCPCR 2024: 15+ deepfake bullying cases in schools.

4. Bias & Language

AI trained on urban English data labels rural/SC/ST students “slow” wrongly. Bhashini's Santhali accuracy only 70%, causing textbook errors.



5. Academic Misuse

UNESCO 2023: 62% students use ChatGPT for homework. CBSE 2025: 200+ AI cheating cases. AI “hallucinates” wrong facts in exams.

6. Policy & Money Gap

NEP 2020 has no separate AI budget. Only 20,000 of 10 lakh schools teach AI. 40% Atal Labs’ AI kits non-functional due to no repair funds.

Future Scope For AI In Indian Education System

1. NEP 2020 Targets by 2030

AI Guru for Every Student: NEP 2020 Sec 24.4 envisions 24x7 AI tutors in all Indian languages. By 2030, DIKSHA AI aims to reach 25 Cr students with personal doubt-solving, up from 20 Cr now.

AI as Compulsory Subject: CBSE plans AI + Coding for all Class 6-12 by 2030, up from Class 8-10 now. Target: 50 lakh AI-skilled school students to feed India’s \$1 Trillion AI economy.

100% Vernacular Content: Bhashini 2.0 roadmap: All NCERT, JEE, NEET content in 22 languages + 121 dialects using real-time AI dubbing by 2028.

2. Next-Gen AI Applications Coming

AI for Teachers: “Teacher AI Assistant” will auto-check homework, detect student emotions via webcam, and suggest teaching method changes live. Pilot in KVS 2026. VR + AI Classrooms: PM e-VIDYA 2.0 to launch AI + VR labs in 10,000 schools. Student wears headset, AI teacher explains heart surgery in 3D or takes virtual tour of Harappan sites.

Predictive AI for Full Lifecycle: AP model will expand — AI will track child from Anganwadi to Class 12, predict dropout, skill gaps, career path. Suggest ITI vs Degree vs Startup path.

AI for Special Needs: IIT-M’s “AI Sign Language Avatar” will convert all DIKSHA videos to Indian Sign Language by 2027 for 27 lakh deaf students. AI Braille converters for blind students.

3. Bridging Current Gaps

Offline AI 2.0: ConveGenius + Jio working on ₹2000 AI tablet that runs LLM offline. Target: 1 Cr rural students by 2030 without internet.

AI Teacher Training: NCERT’s NISHTHA 4.0 will train all 96 lakh teachers in AI by 2028 using AI itself. Teachers learn via AI mentor on phone.

Safe AI for Kids: MeitY 2025 “Child-Safe AI Policy” will mandate all edtech AI to have age filters, data-localization, and parent dashboard. No foreign data storage.

4. Impact on Indian Economy & Society

Demographic Dividend: 50 lakh AI-skilled students by 2030 = world’s largest AI-ready workforce. Can fill global AI job gap.

Rural Transformation: If offline AI reaches 5 lakh villages, ASER learning levels can rise from 50% to 80% by 2035.

New Jobs: “AI Curriculum Designer”, “AI Ethics Teacher”, “Prompt Engineer for Education” — 10 lakh new education jobs by 2030 [NASSCOM 2024].

BharatGPT for Education: India’s own LLM trained on NCERT + Indian context will replace ChatGPT in schools by 2027. No Western bias, 100% factual for Indian history.

III. CONCLUSION

AI under NEP 2020 is transforming Indian education with apps like DIKSHA, Bhashini, TABLAB — giving personal tutors, vernacular content, and cutting dropout. It empowers teachers and helps 20 Cr students. But 76% rural schools lack computers, 65% teachers untrained, and misuse + data risk exist.



Future: “AI Guru by 2030” aims for 1 AI tutor per child in mother tongue. If internet + training gaps are fixed, AI can give every village child equal quality as urban private schools — making it a bridge, not barrier for 26 Cr students.

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