Digital Convergence: Open Educational Resources and the Paradigm Shift in Indian Higher Education under NEP 2020

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Abstract

The intersection of Open Educational Resources (OER) and Artificial Intelligence (AI) represents the most significant technological synergy within India's National Education Policy (NEP) 2020. This study explores the emergence of a multidisciplinary, technologically integrated, and culturally grounded higher education ecosystem in India. By situating OER-AI integration within the mandates of NEP 2020 and the Indian Knowledge System (IKS), this review analyses the operational realities of domestic universities. Utilising a systematic literature review (2018–2025) and institutional data from regulatory bodies such as the UGC and AICTE, the paper examines the deployment of generative AI tools (e.g., ChatGPT, Claude, Perplexity) and specialised platforms (NPTEL AI, SWAYAM). The findings suggest that while NEP 2020 provides a structural mandate for flexibility and multilingualism, institutional adoption remains fragmented. The article concludes with a strategic roadmap for faculty to leverage OER as a scalable solution for resource-constrained academic environments.

Keywords: Open Educational Resources (OER), AI in Education, NEP 2020, Digital Pedagogy, SWAYAM, Indian Knowledge System (IKS), Educational Equity.

1. Introduction

The contemporary landscape of Indian Higher Education (IHE) is experiencing a profound metamorphosis, driven by ambitious policy reforms and rapid technological growth [10]. The National Education Policy (NEP) 2020 envisions a system that is globally competitive yet locally contextualised [1]. At the heart of this vision is the convergence of Open Educational Resources (OER) and Artificial Intelligence (AI)[11]. While OER democratizes access to knowledge, AI provides the personalised, scalable intelligence required to navigate and adapt that knowledge. [13] India faces a unique educational paradox: it manages the world's largest institutional network (over 1,100 universities), yet struggles with deep-seated issues of accessibility, linguistic barriers, and faculty shortages. [9] While the Gross Enrollment Ratio (GER) has climbed to 28.4% (AISHE 2021-22), it remains significantly shy of the 50% target set for 2035. This technological convergence is not merely policy-driven but is an emergent response to the global digitisation of knowledge and the escalating demand for flexible, skill-based learning. The

"mandate" for adoption is thus multifaceted, combining explicit NEP 2020 directives with implicit global economic imperatives and an evolving understanding of digital literacy as a core competency [2]. The cost of inaction is severe. Failure to integrate these technologies will exacerbate digital divides, perpetuate outdated pedagogical models, and widen the gap between IHE and global academic standards, ultimately leading to a stagnant educational system that fails its learners over the coming decade. Conversely, the OER-AI nexus is not merely an "add-on" but a structural necessity to bridge these systemic gaps through cost-effective, multilingual, and modular learning pathways.

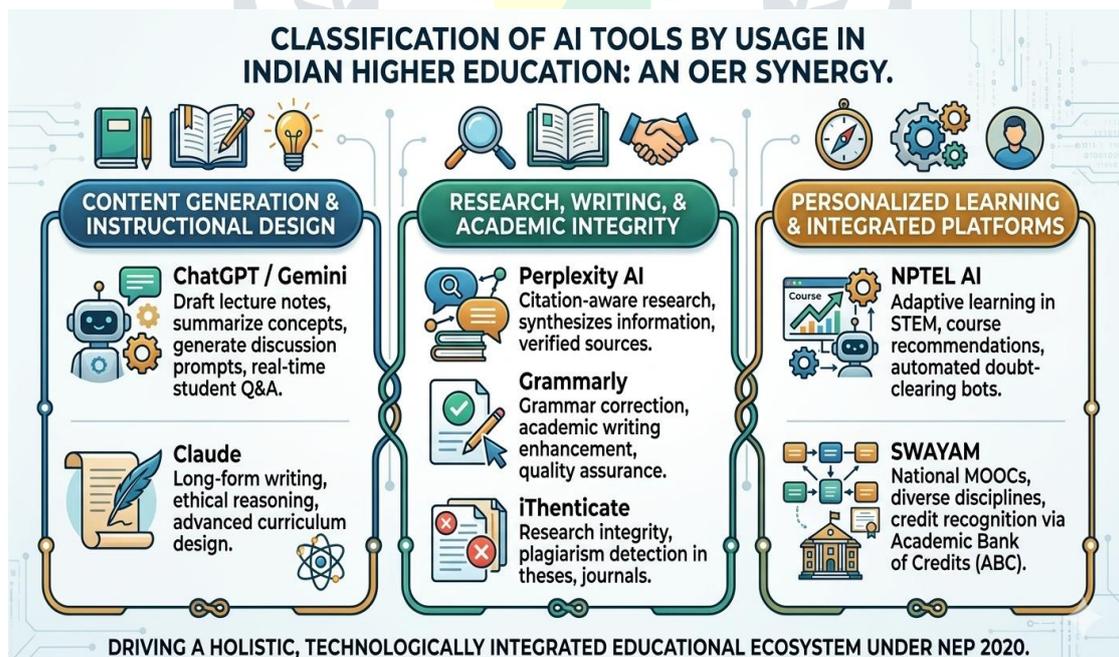## 2. Theoretical Framework: Recontextualising EdTech in India

Traditional educational technology models often fail in India due to insufficient consideration of the country's socio-linguistic complexity. Therefore, a localized framework is required.

2.1 The Ecosystem Model of OER

Moving beyond the UNESCO 2019 definition [4], OER in India must transition from a "repository model" (passive storage) to an "ecosystem model." In this view, resources are living documents that AI helps translate, localise, and align with the National Credit Framework (NCrF). The potential and practical limits of OER availability must, however, be acknowledged. In disciplines with niche specialisations or rapidly evolving content, high-quality, openly licensed resources may be critically undersupplied, forcing a continued reliance on proprietary materials and highlighting the need for a targeted content creation strategy.

2.2 AI as a Pedagogical Catalyst

Artificial Intelligence tools in education are software applications that utilise advanced algorithms, natural language processing, and machine learning to simulate intelligent human behaviors such as reasoning, learning, problem-solving, and personalization to assist in pedagogical, research, and administrative functions [3]. In the Indian context, AI applications ranging from adaptive learning to natural language processing must address "equity by design." This involves mitigating algorithmic bias against marginalised dialects and ensuring functionality in low-bandwidth environments.

CLASSIFICATION OF AI TOOLS BY USAGE IN INDIAN HIGHER EDUCATION: AN OER SYNERGY.

CONTENT GENERATION & INSTRUCTIONAL DESIGN
- **ChatGPT / Gemini** — Draft lecture notes, summarize concepts, generate discussion prompts, real-time student Q&A.
- **Claude** — Long-form writing, ethical reasoning, advanced curriculum design.

RESEARCH, WRITING, & ACADEMIC INTEGRITY
- **Perplexity AI** — Citation-aware research, synthesizes information, verified sources.
- **Grammarly** — Grammar correction, academic writing enhancement, quality assurance.
- **iThenticate** — Research integrity, plagiarism detection in theses, journals.

PERSONALIZED LEARNING & INTEGRATED PLATFORMS
- **NPTEL AI** — Adaptive learning in STEM, course recommendations, automated doubt-clearing bots.
- **SWAYAM** — National MOOCs, diverse disciplines, credit recognition via Academic Bank of Credits (ABC).

DRIVING A HOLISTIC, TECHNOLOGICALLY INTEGRATED EDUCATIONAL ECOSYSTEM UNDER NEP 2020.

[Figure 1: Classification of AI Tools]

3. The National Infrastructure: Current OER Status

India possesses a robust, albeit underutilised, digital infrastructure. The following platforms form the cornerstone of this movement :

i. SWAYAM: The flagship MOOC platform, now hosting over 3,500 courses. Its integration with the Academic Bank of Credits (ABC) enables 40% credit transfer, making it a mainstream pedagogical tool [7].

ii. NPTEL: A pioneer in technical education, NPTEL has begun integrating AI-driven doubt-clearing bots and personalised recommendation engines to enhance STEM learning [6].

iii. INFLIBNET/Shodhganga: With over 500,000 theses, this represents a massive data lake for AI-driven research synthesis and trend analysis [5].

4. Analytical Mapping of AI Tools in Higher Education

The adoption of AI tools is more crucial based on their applications, as mentioned in

Table 1. Evaluation of AI Tools within the NEP 2020 Framework

AI Tool	Primary Use in Indian HEIs	OER Compatibility	NEP 2020 Alignment
ChatGPT	Content generation, lesson planning, student Q&A, research assistance	High – integrates with open platforms	Flexible learning, multilingual pedagogy
Grammarly	Academic writing enhancement, grammar correction, and plagiarism awareness	Medium - freemium model	Quality assurance in assessment
iThenticate	Research integrity, plagiarism detection in theses and journals	Low – licensed tool	Research ethics, academic integrity
Perplexity AI	Realand -time research, citation-aware information retrieval	High – open access	Evidence-based learning
Claude (Anthropic)	Long-form writing, ethical reasoning, and curriculum design	High – API accessible	Multidisciplinary integration
NPTEL AI	Course recommendations, adaptive assessments on the SWAYAM platform	Very High – fully open	Credit transfer, national OER ecosystem
Coursera for Campus	Professional certification, skill-based microcredentials	Medium – freemium	Vocational education, employability
Google Bard/Gemini	Multilingual creation and on, classroom assistance	High – free tier available	Multilingualism, regional language support

5. Epistemic Justice and the Indian Knowledge System (IKS)

A distinctive pillar of NEP 2020 is the integration of IKS. This presents a challenge of "epistemic justice," ensuring traditional knowledge (Ayurveda, Yoga, Vedic mathematics) is represented accurately without being Westernised by AI training biases [8].

5.1 AI-Driven Recovery of IKS

AI offers unprecedented opportunities to digitise ancient manuscripts using Optical Character Recognition (OCR) for Sanskrit and other classical languages[13]. By utilising Knowledge Graphs,

institutions can map traditional concepts to modern scientific paradigms, creating a "bridge curriculum" available as OER.

6.   Strategic Implementation Roadmap for Faculty

Addressing the optimal temporal framework for integration, maximised transformative effect is best achieved through a proactive, rather than reactive, approach. Detailed information is presented in Table 2.

Table 2: NEP 2020, OER, and AI Enhancement

NEP 2020 Mandate	OER Response	AI Enhancement
Multidisciplinary curriculum	Open courseware across disciplines (NPTEL, SWAYAM)	AI-curated learning pathways
Credit transfer and flexibility	Stackable OER modules with credit metadata	Adaptive credit recognition systems
Multilingual instruction	Vernacular OER repositories (e-PG Pathshala, NROER)	Real-time AI translation and dubbing
Indigenous Knowledge Systems	Digitised IKS content under Creative Commons	AI-assisted knowledge mapping and linking
Vocational integration	Skill India OER with NSQF alignment	AI matching of skills to job market data
Research and innovation	Open-access journals, preprint servers	AI literature review, gap identification
Inclusive education	Accessible OER	AI-powered screen readers, captioning

Early introduction across all levels of the curriculum ensures that students and faculty build foundational digital fluency, positioning the institution to seamlessly leverage subsequent technological advancements. The following phased roadmap provides a pathway, especially in resource-limited settings. It is shown in Figure 2.

Phase I: Curatorial Orientation (1 to 3 Months)

     i.   Audit existing course modules against NPTEL/SWAYAM content.

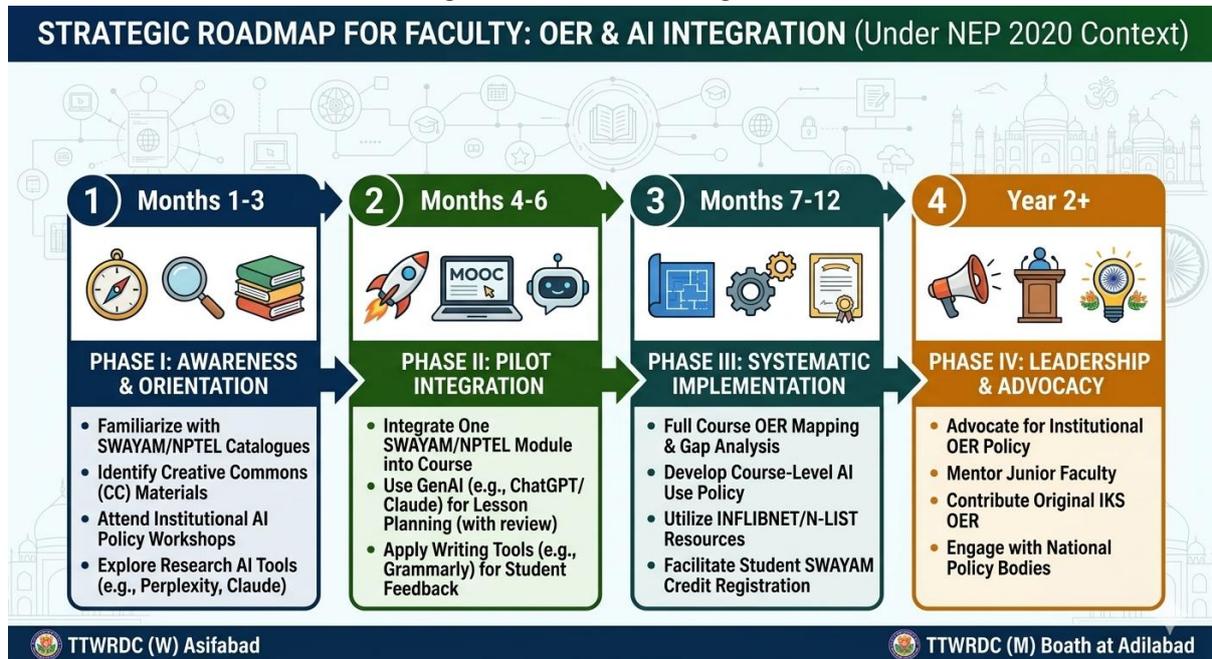   ii.   Establish "Ethical AI" guidelines for student submissions.

Phase II: Augmented Instruction (4 to 6 Months)

     i.   Employ AI (e.g., Claude) to generate "Socratic" discussion prompts from OER texts.

     ii.   2. Introduce formative assessments using AI-driven feedback loops.

Phase III: Institutional Scaling (1 Year)

     i.   Develop localised OER in regional languages using AI translation tools (with human-in-the-loop verification).

     i.   Lobby for institutional recognition of OER creation in Faculty Empowerment Programs (FEP).

Fig 2: OER and AI Integration

STRATEGIC ROADMAP FOR FACULTY: OER & AI INTEGRATION (Under NEP 2020 Context)

1 Months 1-3	2 Months 4-6	3 Months 7-12	4 Year 2+
PHASE I: AWARENESS & ORIENTATION	**PHASE II: PILOT INTEGRATION**	**PHASE III: SYSTEMATIC IMPLEMENTATION**	**PHASE IV: LEADERSHIP & ADVOCACY**
• Familiarize with SWAYAM/NPTEL Catalogues • Identify Creative Commons (CC) Materials • Attend Institutional AI Policy Workshops • Explore Research AI Tools (e.g., Perplexity, Claude)	• Integrate One SWAYAM/NPTEL Module into Course • Use GenAI (e.g., ChatGPT/ Claude) for Lesson Planning (with review) • Apply Writing Tools (e.g., Grammarly) for Student Feedback	• Full Course OER Mapping & Gap Analysis • Develop Course-Level AI Use Policy • Utilize INFLIBNET/N-LIST Resources • Facilitate Student SWAYAM Credit Registration	• Advocate for Institutional OER Policy • Mentor Junior Faculty • Contribute Original IKS OER • Engage with National Policy Bodies

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7. Challenges and Critical Barriers

Despite the potential, several "digital divides" persist:

a. Linguistic Bottlenecks: While AI is improving, nuances in Indian dialects often get "lost in translation."

b. Pedagogical Resistance: There is a notable "technological anxiety" among senior faculty regarding AI-induced displacement.

c. Infrastructural Intermittency: The "Last Mile" connectivity in rural colleges remains the primary hurdle for real-time AI applications.

8. Conclusion

The convergence of OER and AI, framed by NEP 2020, offers a historic opportunity to democratize Indian Higher Education. This integration moves the needle from mere "access" to "meaningful success" by providing personalised, multilingual, and culturally relevant learning. To realise this, policymakers must shift from viewing AI as a threat to viewing it as a "force multiplier" for the overextended Indian academician. The future of the Indian classroom lies in the hybridity of human wisdom and machine intelligence.

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