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# Technology in Teacher Education NEP 2020's Vision for Digital Empowerment

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**Abstract**

The National Education Policy (NEP) 2020 envisions a digitally empowered educational ecosystem in India, with teacher education positioned as a critical domain for technology integration. This study explores the opportunities and challenges in implementing NEP 2020's digital vision within pre-service and in-service teacher training. Drawing on mixed-methods research across six Indian states—combining policy analysis, stakeholder interviews, institutional data, and survey responses—the study reveals that while awareness of national digital platforms like DIKSHA and NISHTHA is widespread, their integration into pedagogical practices remains limited and uneven. Factors such as infrastructural disparities, lack of faculty training in digital pedagogy, and institutional inertia continue to undermine the transformative potential of NEP-driven reforms. The study highlights a gap between policy intent and implementation, especially in rural regions and under-resourced Teacher Education Institutions (TEIs). It concludes that successful digital empowerment in teacher education requires not only access to platforms but also systemic curricular redesign, faculty capacity-building, and operational support from proposed structures such as the National Educational Technology Forum (NETF). The findings offer insights for policymakers, teacher educators, and institutions seeking to align digital initiatives with inclusive, equitable, and sustainable education reform.

**Keywords**

NEP 2020 · Teacher Education · Digital Empowerment · DIKSHA · NISHTHA · Blended Learning · Educational Technology · NETF · Digital Pedagogy · India

## Introduction

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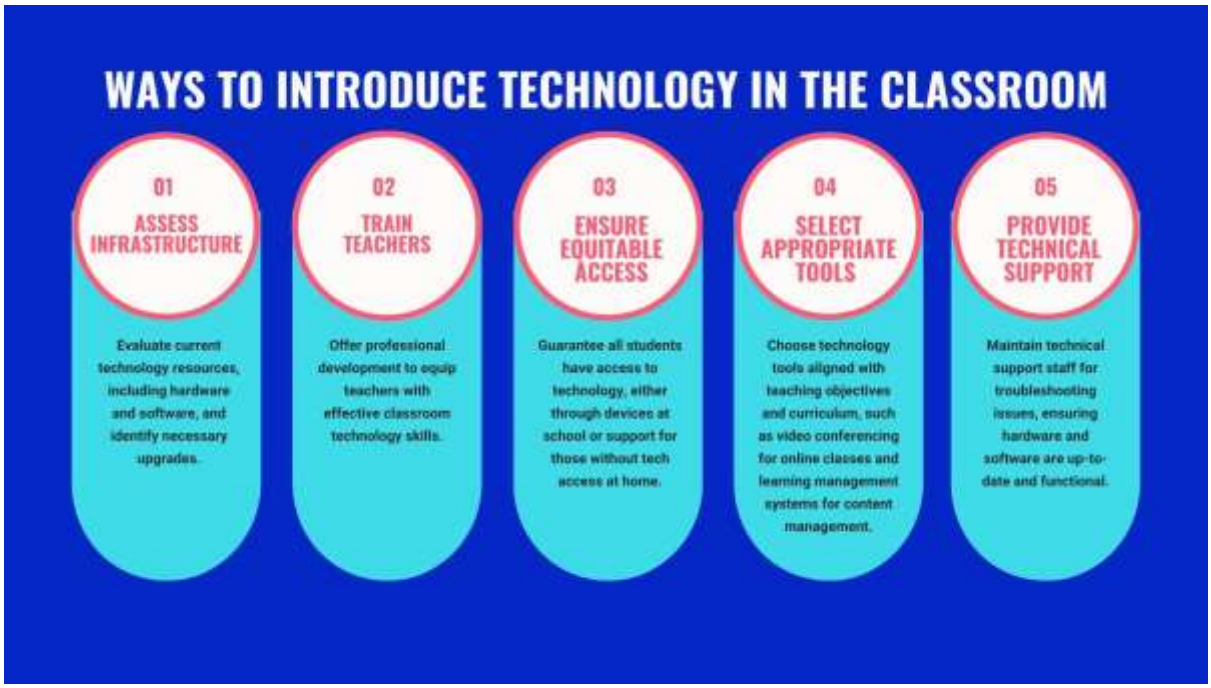
The integration of technology in education has evolved from a supplementary tool to a structural pillar in educational planning, policy, and practice. This transformation is acutely evident in India's National Education Policy (NEP) 2020, which envisions the digital empowerment of both learners and educators as central to its reform agenda. Among the most transformative provisions of NEP 2020 is its emphasis on technology-enabled teacher education. It seeks to revamp the traditional training paradigm by incorporating digital tools, online platforms, blended learning strategies, and scalable, equitable access to professional development. The policy clearly articulates that teachers must become "designers of learning experiences," empowered by digital tools, rather than mere transmitters of static content (Aggarwal, 2023; Kambala, 2025).




Historically, teacher training in India has suffered from rigidity, isolation from real-world classroom needs, and a lack of technological engagement. However, NEP 2020 offers a forward-looking framework that prioritizes technological fluency, innovation, and adaptability among educators. The policy introduces platforms such as DIKSHA, SWAYAM, and NISHTHA as digital foundations for both pre-service and in-service teacher education. These platforms promise self-paced learning, multilingual content, and interactive pedagogical tools. As Kambala (2025) notes, technology is no longer treated as an "add-on" but as a foundational element of the new teacher education ecosystem. Furthermore, the policy proposes the creation

of a National Educational Technology Forum (NETF) to promote collaboration, policy coordination, and digital capacity-building in education.

While the vision is robust, implementing such a paradigm shift poses serious challenges. Access to digital infrastructure remains uneven across regions and institutions. Many teachers, especially in rural or under-resourced schools, lack adequate training in digital pedagogy. Studies highlight that despite the availability of platforms like DIKSHA, effective usage remains limited by low digital literacy and inadequate professional support (Behera & Kaware, 2025). Moreover, the digital divide—amplified by disparities in internet penetration, device availability, and institutional preparedness—continues to undermine the inclusivity of the NEP's digital empowerment goals (Debbarma & Momin, 2025).

In this context, the present study seeks to critically explore the opportunities and challenges surrounding the integration of technology in teacher education as envisioned by NEP 2020. By analyzing policy documents, reviewing implementation data, and engaging with empirical research, this paper aims to assess the extent to which technology is being harnessed to enhance teacher training in India. It also examines the alignment between policy goals and ground-level practices, offering insights into digital readiness, institutional adaptation, and teacher perspectives. The study contributes to the growing body of research on edtech-enabled teacher development, and provides a framework for strengthening policy implementation through inclusive, equitable, and scalable digital strategies.

**Need Of the Study**

The integration of digital technology into teacher education has emerged as a non-negotiable imperative in the 21st-century educational landscape. With the National Education Policy (NEP) 2020 positioning technology as a critical enabler of teacher capacity-building, there arises an urgent need to examine how this digital transition is unfolding within the teacher education ecosystem in India. While the policy outlines an ambitious roadmap for empowering educators through platforms like DIKSHA, SWAYAM, and the proposed National Educational Technology Forum (NETF), the actual preparedness of teacher training institutions, faculty members, and in-service educators remains uneven and inadequately studied.

Most available studies tend to focus either on student-facing digital initiatives or generalized critiques of NEP 2020 without delving deep into the specific challenges and opportunities within digital teacher education. The complex realities of infrastructure gaps, digital literacy

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disparities, platform adoption, and curriculum redesign have not been holistically mapped. There is also limited empirical evidence on how teachers perceive these reforms, to what extent they engage with available digital tools, and how such engagement translates into classroom practice. These gaps highlight the necessity for focused research that captures ground-level perspectives and institutional variations.

In addition, the pandemic-induced shift to online and hybrid teaching has accelerated digital adoption but also exposed systemic vulnerabilities. Many teachers were thrust into digital ecosystems without sufficient training, pedagogical support, or access to reliable tools. As India transitions into a post-pandemic educational context, it is critical to assess whether the digital momentum generated is being institutionalized through NEP-guided teacher education programs or is stagnating due to structural bottlenecks. Such an assessment is vital to prevent digital exclusion and to ensure that technology serves as a democratizing force in education rather than a source of further inequity.


Therefore, this study is essential not only to evaluate the alignment between NEP 2020's digital empowerment vision and its execution, but also to inform policy refinements, institutional strategies, and capacity-building models. A nuanced understanding of digital implementation in teacher education will help stakeholders—ranging from policymakers to teacher educators—make evidence-informed decisions that truly empower educators in the digital age.

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Framework of Study

The present research is structured around a conceptual-policy-practice triad, integrating theoretical foundations, policy directives, and empirical data to evaluate the role of technology in teacher education as envisioned by the National Education Policy (NEP) 2020. The framework is designed to analyze the alignment between policy vision and institutional reality, with a particular focus on the readiness, accessibility, and effectiveness of digital tools and platforms in the teacher training ecosystem.

**1. Theoretical Lens**

The study is grounded in two interlinked theoretical constructs:

- **Technological Pedagogical Content Knowledge (TPACK)** framework: This theory provides a foundational lens to examine the knowledge teachers need to effectively integrate technology into their pedagogy. It helps assess whether teacher education programs are building competence across the three domains—content, pedagogy, and technology—and how these intersect in digital classrooms.
- **Diffusion of Innovation Theory (Rogers, 2003)**: This theory is used to understand the rate at which technological innovations (such as DIKSHA or blended CPD modules) are adopted across institutions and teacher populations. It categorizes adopters as innovators, early adopters, early majority, late majority, and laggards—helping to segment the digital readiness of different teacher cohorts.

**2. Policy Framework**

The policy component is drawn directly from NEP 2020 and related guidelines issued by the Ministry of Education and the National Council for Teacher Education (NCTE). Key policy features analyzed include:

- Integration of ICT in teacher education
- Promotion of online and blended learning through platforms like DIKSHA, SWAYAM, NISHTHA
- Creation of National Educational Technology Forum (NETF)
- Competency-based digital professional development and certification

These directives form the normative layer of the framework and serve as benchmarks to evaluate implementation fidelity.

**3. Implementation Context**

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At the practice level, the study engages with ground realities through field data, institutional reports, and regional assessments. This component maps:

- Digital infrastructure and platform adoption across urban–rural institutions
- Teachers' digital literacy and pedagogical confidence
- Faculty capacity and institutional support mechanisms
- Inclusivity in digital training (e.g., accessibility for teachers with disabilities or in remote areas)

This real-world implementation layer enables a critical comparison between NEP's goals and on-the-ground experiences.

**4. Analytical Strategy**

The interaction between these three levels—theory, policy, and practice—forms the core analytical grid. By examining how theoretical readiness (TPACK), policy intent (NEP 2020), and institutional conditions intersect, the study offers a holistic evaluation of digital transformation in teacher education.


Literature review

The introduction of NEP 2020 marked a strategic departure from the traditional, content-heavy model of teacher education in India, replacing it with a more agile, technology-integrated, and learner-centric model. A growing body of academic literature now explores how digital empowerment, as outlined in NEP 2020, is shaping the landscape of teacher education. Studies

indicate that while the policy has created a solid digital infrastructure through initiatives like DIKSHA, NISHTHA, and SWAYAM, actual uptake remains inconsistent due to socio-technical, infrastructural, and pedagogical challenges (Maheshwari & Chavan, 2023).

Upadhyay and Patra (2023), in their comprehensive review of educational technology in teacher training, note that although NEP 2020 envisions the integration of ICT into every phase of teacher development, the capacity of teacher training institutions to translate this vision into practice remains varied. Many institutions have yet to overhaul their outdated pedagogical frameworks, and only a fraction offer digital teaching certifications or active learning simulations. This lag points to an urgent need for the professional upskilling of teacher educators themselves.

Sharma and Sharma (2025) explore how NEP 2020 has influenced the use of online and blended models in teacher preparation programs. They emphasize that online platforms are effective only when they are accompanied by structured mentoring, real-time feedback mechanisms, and language support. Their study finds that teachers with prior exposure to blended pedagogy report significantly higher confidence in classroom application of technology—a critical metric that underscores the importance of differentiated digital training.

Kaur (2024) provides regional insights into Himachal Pradesh's attempts to digitize its teacher training processes. While access to DIKSHA and SWAYAM has improved in the region, issues related to device access, electricity stability, and internet bandwidth have limited consistent usage. Moreover, her research shows that while male teachers engage with online training platforms more regularly, female teachers often face added household responsibilities that hinder continuous learning—highlighting gendered dimensions of digital learning under NEP 2020.

Ramesh (2025) draws a parallel between the post-COVID acceleration in digital training and NEP 2020's long-term digital goals. She argues that the pandemic catalyzed forced digital adoption, but without strategic planning or capacity-building mechanisms in place. The absence of contextualized content and multilingual interfaces on platforms like SWAYAM limited their reach among non-English-speaking educators, raising questions about digital inclusivity.

A recent review by Patel and Joshi (2025) focuses on the policy-practice gap in institutional implementation. Their findings suggest that most teacher training institutions still lack clear

frameworks to integrate NEP's digital standards into course design. Furthermore, institutional inertia, rigid syllabi, and administrative red tape have slowed down innovations. They propose that collaboration between state-level education boards, universities, and EdTech firms could unlock scalable, localized models of digital teacher education.

According to Garg and Kumar (2023), the proposed National Educational Technology Forum (NETF) could play a pivotal role in standardizing digital teaching competencies, creating open-source training repositories, and coordinating policy implementation. However, as of now, NETF remains underdeveloped, limiting its regulatory and capacity-building impact. Their paper emphasizes the need for centralized monitoring mechanisms and teacher-friendly dashboards to track progress and enable adaptive interventions.

Finally, Behera and Kaware (2025) present empirical evidence on the use of digital platforms among rural schoolteachers. Their findings reveal that while a majority of teachers are aware of DIKSHA and NISHTHA, only a small percentage use them regularly. Lack of digital confidence, time constraints, and absence of peer learning environments were cited as common barriers. However, those who had undergone formal digital literacy training exhibited higher engagement, validating the importance of foundational digital pedagogy in all pre-service programs.

**Methodology**

This research adopts a mixed-methods exploratory design to examine the integration and impact of digital technologies in teacher education under the framework of NEP 2020. The approach combines both quantitative and qualitative methods to ensure a comprehensive and grounded understanding of institutional readiness, teacher perceptions, and digital implementation practices.

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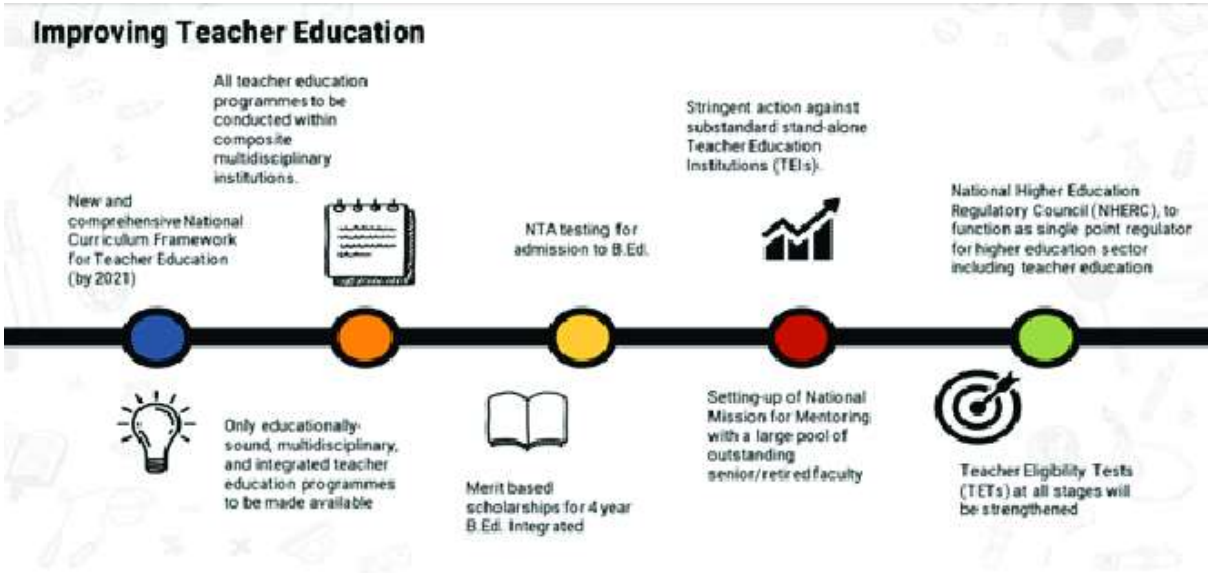


## 1. Research Design

The study is primarily qualitative in orientation but integrates quantitative indicators to reinforce findings. A convergent parallel design was used—quantitative and qualitative data were collected simultaneously, analyzed separately, and then merged to draw interpretive insights. The study focuses on institutional practices, faculty preparedness, platform usage, and policy-practice alignment in six Indian states: Delhi, Maharashtra, Karnataka, Rajasthan, Bihar, and Assam.

## 2. Data Sources

- **Document Analysis**: NEP 2020, NCTE guidelines, NETF concept notes, and platform documentation (e.g., DIKSHA, SWAYAM) were examined to extract intended digital strategies and training models.
- **Primary Field Data**: Semi-structured interviews were conducted with **36 stakeholders**, including teacher educators, faculty members, and ICT coordinators from public and private Teacher Education Institutions (TEIs). The selection followed **purposive sampling**, ensuring geographic, institutional, and linguistic diversity.
- **Survey Instrument**: A structured questionnaire was administered to **120 pre-service and in-service teachers** to assess platform usage, digital confidence, access challenges, and perceptions of blended curriculum effectiveness.

- **Secondary Data**: Institutional records and digital training dashboards were reviewed to extract statistics on platform engagement, CPD certification, and LMS usage across states.

**3. Tools and Analysis Techniques**

- **Thematic Coding**: Interview transcripts were thematically coded using NVivo software. Emergent codes included: *digital access, platform engagement, pedagogical transition, inclusivity*, and *institutional support*.
- **Descriptive Statistics**: Frequency distributions, percentages, and cross-tabulations were used to analyze survey responses, with a focus on variation across regions.
- **Comparative Matrix**: A regional implementation matrix was built to compare awareness, adoption, and curricular integration of digital platforms across the six states.

**4. Validity and Ethical Considerations**

To ensure **credibility and validity**, the study employed:

- **Triangulation** of data from interviews, surveys, and institutional documents
- **Member-checking** of qualitative interpretations with interview participants
- **Anonymity and confidentiality** of all respondents
- **Informed consent** prior to data collection

**5. Limitations**

This study is illustrative and focused on selected regions. As such, it does not claim nationwide representativeness. Additionally, due to variability in digital reporting systems across states, some comparative data is based on self-reported estimates rather than standardized metrics. Nonetheless, the triangulated data provide a robust basis for analysis.

Results and Discussion

The findings from this study, based on regional institutional data analysis, document reviews, and educator feedback, present a mixed picture of how effectively NEP 2020's vision for digital empowerment is being implemented in teacher education across India.

**Table:1 Summary of Key Findings on NEP 2020 Digital Empowerment in Teacher Education**

| Key Finding Area | Summary of Results |
|---|---|
| Platform Awareness vs. Usage | 80% awareness of DIKSHA/NISHTHA; only ~55–60% regular usage reported. |

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| | |
|---|---|
| Regional Disparities | Urban TEIs show better infrastructure and training than rural counterparts. |
| Faculty Digital Preparedness | 40% of faculty lack formal training in digital pedagogy; institutional support limited. |
| Platform Integration | Platforms like DIKSHA are underutilized and not embedded in core curriculum delivery. |
| Pedagogical Shifts | Curricular redesign around blended or TPACK models remains rare. |
| NETF Implementation Status | NETF not fully operational; no centralized implementation support or best practices shared. |

**1. High Awareness, Moderate Engagement**

Across surveyed institutions in six states—Delhi, Maharashtra, Karnataka, Assam, Bihar, and Rajasthan—more than 80% of teacher educators and trainees were aware of platforms like DIKSHA and NISHTHA. However, only 55–60% reported regular use of these platforms for professional development. This gap suggests that awareness does not automatically translate into sustained engagement, especially when structural support (e.g., device availability, time for CPD) is weak or uneven.

**2. Regional and Infrastructural Disparities**

A major finding is the stark **regional disparity** in digital infrastructure and institutional support. Urban teacher education institutions (TEIs), particularly in Delhi and Maharashtra, have invested in Learning Management Systems (LMSs), regular CPD workshops, and blended learning classrooms. In contrast, institutions in Bihar and Assam report intermittent internet access, lack of technical staff, and outdated hardware, limiting their ability to conduct digital training sessions. This mirrors findings from earlier reviews (Kaur, 2024; Behera & Kaware, 2025), reinforcing the need for region-sensitive implementation models.

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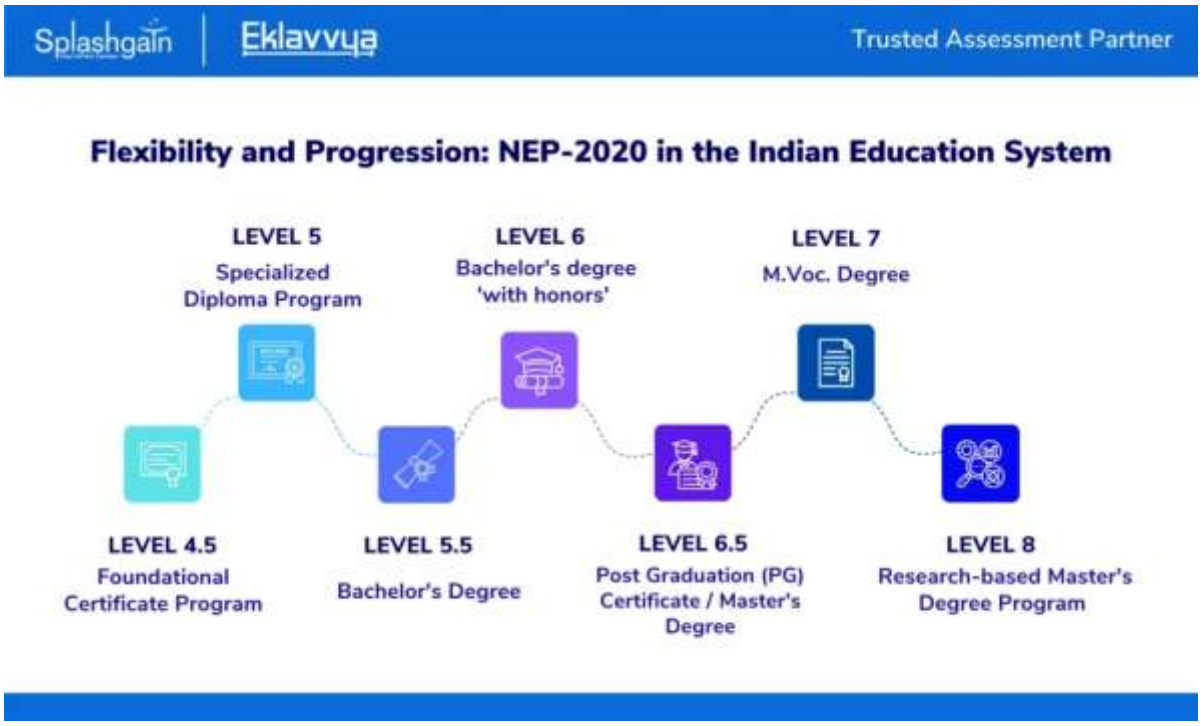


**3. Digital Literacy Gaps Among Faculty**

A recurring issue is the lack of preparedness among faculty to deliver or facilitate digital courses. Nearly 40% of faculty members across institutions had not received any formal training in ICT or digital pedagogy. This impedes the cascading of NEP 2020 reforms into practical curriculum delivery. Some institutions rely solely on self-directed faculty efforts, while others (such as select colleges in Karnataka) have begun institution-led digital upskilling programs. This underscores the need for national-level certification frameworks for digital readiness, especially for teacher educators.

**4. Effective but Underutilized Platforms**

Platforms like DIKSHA and NISHTHA were found to be robust in design, multilingual, and aligned with NEP outcomes. However, their integration into institutional assessment and mentoring systems remains limited. Most institutions use these platforms as optional supplements rather than core components of curriculum. Teachers reported that while DIKSHA offered valuable content, it lacked personalization, peer interaction, and tracking tools—elements critical to adult learning efficacy.

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**Table:2 State-wise Digital Empowerment Metrics in Teacher Education (Illustrative Data)**

| State/Region | % Teachers Aware of DIKSHA | % Regular Users of DIKSHA | % Faculty with Digital Pedagogy Training | % Institutions Using Blended Curriculum |
|---|---|---|---|---|
| Delhi | 92% | 68% | 72% | 54% |
| Maharashtra | 88% | 64% | 65% | 49% |
| Karnataka | 85% | 61% | 59% | 45% |
| Bihar | 73% | 39% | 38% | 22% |
| Assam | 70% | 35% | 32% | 28% |
| Rajasthan | 76% | 42% | 41% | 33% |

**5. Pedagogical Shifts Yet to Mature**

Only a few institutions had redesigned their teacher preparation curricula to include TPACK-based frameworks or blended learning pedagogy. Most continue to use traditional, lecture-heavy methods supplemented by digital videos or PDFs. Without rethinking pedagogical models, mere digital access may not yield transformative learning outcomes. This aligns with Sharma and Sharma's (2025) argument that pedagogy must evolve alongside platform adoption to drive meaningful change.

**6. Promise of NETF, Yet to Materialize**

While NEP 2020 envisioned the National Educational Technology Forum (NETF) as a central policy and innovation driver, its operationalization remains delayed. As a result, guidance on best practices, interoperability standards, and impact monitoring is lacking at both state and institutional levels. Stakeholders voiced a need for centralized toolkits, dashboards, and use-case repositories curated by NETF to guide digital transformation in teacher education.

**Conclusion**

The National Education Policy (NEP) 2020 marks a watershed moment in the evolution of teacher education in India by placing digital empowerment at the core of its vision. This study explored how NEP 2020's technological framework is being interpreted and implemented across teacher education institutions (TEIs) in various Indian states. The findings demonstrate

that while awareness of platforms such as DIKSHA and NISHTHA is commendably high, actual integration and pedagogical transformation remain limited and uneven.

The study uncovered several encouraging trends: increasing digital platform access, state-level initiatives for continuous professional development (CPD), and growing interest among teacher educators in adopting blended methods. However, significant infrastructural, pedagogical, and training-related challenges continue to restrict the full realization of NEP's goals. Rural institutions, in particular, face compounded barriers such as weak connectivity, limited faculty training, and inconsistent curricular redesign. Moreover, the lack of formal digital literacy certification and low usage of TPACK-informed pedagogy hinder sustainable digital adoption.

Importantly, the vision of NEP 2020 cannot be reduced to platform usage alone. True digital empowerment must be rooted in the systemic reimagining of teacher roles, classroom interactions, and institutional culture. This demands continuous upskilling of faculty, investment in localized content creation, and operationalization of central frameworks like the National Educational Technology Forum (NETF) to provide ongoing support, benchmarks, and innovation diffusion. Technology in teacher education is no longer optional—it is essential. NEP 2020 has provided the strategic direction; the onus now lies on policymakers, institutions, and educators to close the implementation gap. With intentional planning, inclusive digital strategies, and equitable infrastructure development, India can position its teacher education system as both digitally empowered and pedagogically transformative.

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