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ENHANCING TEACHER READINESS: PROFESSIONAL DEVELOPMENT AND DIGITAL INTEGRATION UNDER NEP 2020

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RESEARCH ARTICLE

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Abstract
This review-based paper examines how digital transformation under the National Education Policy (NEP) 2020 can enhance teacher readiness in both pre-service and in-service teacher education. Drawing on policy documents, government reports and recent research, the study analyses the integration of digital technologies within the four-year integrated B.Ed. programmes and in continuous professional development for serving teachers. The review highlights promising practices such as the use of national platforms like DIKSHA and SWAYAM, blended learning, virtual practicum, and online communities of practice, which can strengthen teachers' pedagogical and digital competencies. At the same time, it identifies key challenges including inadequate infrastructure, the digital divide, limited ICT confidence among teachers and teacher educators, and uneven institutional support. The paper concludes with practical recommendations to embed technology-rich experiences across pre-service curricula, design school-based and peer-supported CPD models, and create enabling conditions so that digital initiatives under NEP 2020 translate into meaningful improvements in teacher readiness.

Keywords: *Teacher Readiness, Professional Development, Digital Transformation, NEP 2020, Teacher Education, Pre-service Training, In-service Training, Educational Technology*

Introduction

India's National Education Policy 2020 (NEP 2020) announces a revolutionary transformation in the education sector, placing unprecedented emphasis on digital transformation centred around teacher education. This policy places unparalleled emphasis on preparing teachers for modern technology-enabled teaching through pre-service and in-service teacher training, enabling them to ensure the holistic development of students—knowledge, skills, values, and creativity. Overcoming the limitations of traditional teacher training, such as one-way teaching and lack of technology, NEP 2020 focuses on digital literacy, technological skills, and innovative pedagogy for teachers through digital platforms like SWAYAM, DIKSHA, e-Pathshala, blended learning models, National Professional Standards for Teachers (NPST), and Continuous Professional Development (CPD). This transformation will not only enhance the individual skills of teachers but also elevate the Indian education system to world-class standards, positioning India as a leader in the knowledge-based economy by 2040.

In today's digital age, the education system has transformed rapidly due to the COVID-19 pandemic, highlighting the need for teachers to be prepared for technology-centric pedagogy. Education has become limitless through online classrooms, virtual laboratories, AI-based adaptive learning, and mobile apps, but the digital divide among teachers remains a major obstacle to this progress. Article 16.6 of NEP 2020 explicitly states that a 4-year integrated B.Ed. program will be introduced for pre-service teacher training, integrating multidisciplinary knowledge with ICT (Information and Communication Technology) skills, data analytics, and digital pedagogy. On the other hand, 50 hours of annual CPD have been made mandatory for in-service teachers, which will be provided through online modules, webinars, and micro-credentials. This dual strategy will transform teachers from mere knowledge providers into facilitators, mentors, and innovators, bridging the digital divide and ensuring equitable education for all children, regardless of rural-urban background or socioeconomic status. However, this digital transformation faces several challenges, such as infrastructural deficiencies (lack of internet, devices, and electricity), inadequate technological training for teachers, low digital literacy, and connectivity issues in rural areas. Furthermore, outdated curricula and a lack of skilled trainers in teacher education institutions also pose significant obstacles. This paper, titled "Enhancing Teacher Readiness: Professional Development and Digital Integration Under NEP 2020," provides an in-depth analytical discussion of these issues, highlighting

the strategic aspects of digital integration in pre-service and in-service training, current challenges, and actionable recommendations. This discussion, framed within the National Curriculum Framework for Teacher Education (NCFTE 2021), will provide future direction for teacher education.

This vision of NEP 2020 enhances teacher autonomy, promotes merit-based evaluation, and fosters collaborative teacher communities where they can share digital best practices. Tech-enhanced activities in school internships, virtual reality-based simulations, and data-driven lesson planning are part of this process. The objective of this paper is to propose practical steps to achieve these goals of the NEP, ensuring that teacher education becomes a key driver of India's educational revolution.

Literature Review

In the context of NEP 2020, contemporary research has provided important insights focusing on three aspects: teacher readiness, professional development, and digital integration. Kumari (2024), in her article "NEP 2020 and Teacher Education: Transforming Teacher Training Programs," shows that the four-year integrated B.Ed. program, multidisciplinary teacher education institutions, long-term school internships, and ICT-enriched pedagogy have been adopted as strategies to strengthen the readiness of pre-service teachers by enhancing their theoretical knowledge, practical skills, and digital competencies.

The article also emphasizes that the quality of teacher preparation depends not only on the course structure but also significantly on the integration of foundational skills, 21st-century skills (critical thinking, problem-solving, collaboration), and reflective practice into the curriculum.

On the other hand, Singh (2025), in his article "Transforming Teacher Education in India: Critical Appraisal of NEP 2020's Vision, Implementation Challenges, and Strategic Pathways," while supporting the ambitious vision of NEP 2020, identifies several structural challenges at the implementation level. He argues that although the proposed four-year B.Ed., continuous CPD, NPST, and technology-supported inclusive pedagogy are conceptually progressive, weak funding, lack of adequate infrastructure and human resources in many Teacher Education Institutions (TEIs), the rural-urban digital divide, and an overly "top-down" policy-making process are complicating implementation at the ground level. In particular, very few institutions have so far been able to fully adopt the integrated B.Ed. framework, technology-based practicums, and context-specific CPD—resulting in regional disparities under the same policy. Singh recommends that to truly enhance teacher readiness, the structural reforms of the NEP need to be complemented by context-specific training, teacher voice, and participatory monitoring. A study by Kumari and Kumar (2025), "National Education Policy-2020 and Readiness of Teacher Education Institutions: Issues and Challenges," which examined the actual preparedness of Teacher Education Institutions (TEIs), reveals that several deficiencies exist in infrastructure, human resources, and curriculum regarding the implementation of the professional development and digital integration mandated by the NEP 2020. According to their findings, many TEIs lack adequate smart classrooms, high-speed internet, digital content, learning management systems, and ICT-skilled teacher educators; consequently, teachers' professional development at both pre-service and in-service levels remains largely confined to traditional lecture-based models. The study argues that to make the annual 50 hours of CPD mandated under the NEP truly effective in improving teacher preparation, school-based, needs-based, and technology-supported training modules are required, which are not yet universally established.
Pan (2025), in his article "Transforming Teacher Education in India: The Role of NEP 2020 in a Dynamic Socio-Economic Context," analyses teacher readiness in conjunction with broader socio-economic and technological changes. He demonstrates that the NEP 2020's emphasis on competency-based and inclusive pedagogy, skill development, and modern pedagogies can align teacher preparation with the needs of the country's changing job market and digital economy; however, the lack of quality TEIs, adequate ICT infrastructure, and locally relevant digital resources in rural and marginalized areas could also create new forms of inequality in teacher readiness. According to Pan, to enhance teacher readiness, it is crucial to translate the digital integration outlined on paper into practical strategies suitable for low-bandwidth, device-poor contexts. A critical article by Meena and Meena (2024), published in AIJRA, also emphasizes the role of professional development and digital integration in increasing teacher readiness under the NEP 2020. According to their analysis, the four-year integrated B.Ed. program, the closure of weak Teacher Education Institutions (TEIs), the introduction of the National Professional Standards for Teachers (NPST), research-based programs, and ICT-based training—all have the potential to make the teaching profession more professional and efficient; however, region-wise resource gaps, weak quality assurance mechanisms, and in many cases, a lack of teacher-centric decision-making are failing to bring teacher readiness to the desired level. They have recommended that to truly enhance teacher readiness, Continuing Professional Development (CPD) should not be limited to mere certificate-based training, but should be integrated with reflective practice, peer collaboration, and technology-enabled mentoring.

This literature collectively indicates that three major realities are evident for your research under the title "Enhancing Teacher Readiness: Professional Development and Digital Integration Under NEP 2020": (i) at the policy level, the integrated B.Ed., NPST, and CPD have provided a strong vision for developing teacher readiness; (ii) limitations related to infrastructure, curriculum, and human resources in Teacher Education Institutions (TEIs) are hindering the full realization of this vision; and (iii) while digital integration is central to enhancing teacher readiness, ignoring the digital divide and local contexts can also become a source of new inequalities—which indicates that efforts to develop and evaluate context-sensitive models, such as those in your research, are now highly relevant.

Research Objectives

This research primarily explores the ways in which digital transformation is impacting pre-service and in-service teacher education in India, with a particular focus on the provisions and vision outlined in the National Education Policy (NEP) 2020. The specific objectives of this study are to:

i. To analyse the key provisions of NEP 2020 related to digital technology integration in teacher education.
ii. To examine how digital technology is currently integrated into pre-service and in-service teacher training programs aligned with NEP 2020.
iii. To identify opportunities that digital technology creates for enhancing teacher competencies and professional development.
iv. To explore the challenges and barriers in effective digital technology adoption in teacher education as envisioned by NEP 2020.

Methodology

This study is review-based qualitative research, primarily utilizing document and literature analysis. The research involved a thorough review of policy documents, government reports, and peer-reviewed articles related to teacher education reforms under NEP 2020, specifically focusing on professional development at the pre-service and in-service levels and the integration of digital technologies. This approach facilitated the synthesis of existing knowledge, the identification of recurring patterns and gaps in the implementation process, and the emergence of new themes, which informed the subsequent analysis and practical recommendations. The research steps included: (i) selecting relevant literature and policy documents related to NEP 2020 and teacher education, (ii) identifying key concepts related to teacher readiness, professional development, digital integration, and implementation challenges through careful reading of these documents, and (iii) clustering these concepts for theme-based analysis. The qualitative analysis of the collected data consolidated the main findings, revealed recurring patterns and trends, and provided significant insights and recommendations regarding the role of professional development and digital transformation in enhancing teacher preparedness in the context of NEP 2020.

Digital Technology Integration in Pre-service Teacher Education

NEP 2020 explicitly mentions the mainstreaming of digital technology in pre-service teacher education, so that future teachers are prepared from the very beginning for technology-rich, learner-centred and competency-based teaching. Within the framework of the four-year integrated B.Ed. programme, emphasis is therefore placed on including Information and Communication Technology (ICT) not as a separate subject but as an integrated component in various courses; such as using digital tools in lesson planning and presentation, e-content design, critical selection of online resources, and management of the teaching-learning process through Learning Management System (LMS), etc. Thus, the aim is to develop technology-friendly, confident and professional responsibility among the teachers-students at the pre-service stage, which will later serve as the basis for implementing the digital transformation initiatives of NEP 2020 at the school level.

Digital integration is also considered an important component in the practicum and school internship component of pre-service teacher education, where student teachers are given hands-on experience in delivering lessons using smart classrooms, projectors, tabs/mobile apps, educational portals and platforms (such as DIKSHA, SWAYAM, etc.), designing online-offline assignments, and maintaining digital portfolios in a real school environment.

At the same time, by developing awareness about equitable availability of digital resources, low-bandwidth content usage habits, cybersecurity, and digital ethics, future teachers are prepared to use technology not just for display, but as a means of inclusive and equitable learning. Thus, the planned integration of digital technology at the pre-service level helps in taking teacher readiness to a higher level, which is in line with the declared objective of NEP 2020.

Digital Technology Integration in In-service Teacher Education

The NEP 2020 identifies digitally-enabled continuous professional development (CPD) in in-service teacher education as a key strategy for enhancing teacher readiness, mandating a specified number of training hours annually through online, blended, and school-based models. Through this process, teachers can regularly learn about new pedagogies, assessment methods, inclusive education, and updated subject-specific content using platforms such as DIKSHA, SWAYAM, online MOOCs, webinars, and virtual workshops, thereby increasing their professional skills and confidence.

Another important aspect of integrating digital technology at the in-service level is school-based and peer-based professional learning, where teachers share lesson plans, conduct micro-teaching and peer feedback, and collaboratively work on solving teaching problems using online communities of practice, WhatsApp/Telegram groups, Google Classroom, or other LMS platforms. Furthermore, the use of e-content and digital assessment tools not only makes in-service teachers technologically proficient but also makes their classrooms more participatory, data-driven, and student-centered, which is considered a crucial dimension of teacher readiness under the NEP 2020.

Challenges in Digital Transformation

Although the NEP 2020 emphasizes digital transformation in teacher education, several serious challenges persist at the practical level, limiting teacher readiness at both pre-service and in-service stages. Many teacher education institutions still lack adequate

computers, internet access, projectors, smart classrooms, or appropriate software; consequently, despite the inclusion of digital technology in the curriculum, its regular use is not possible. In rural and marginalized areas, power and network issues make consistent participation in platforms like DIKSHA, SWAYAM, or other online platforms difficult, further exacerbating the digital divide.

Additionally, a significant number of pre-service teacher trainees and in-service teachers are still not confident in using digital tools, and sometimes perceive technology as an extra burden rather than an integral part of pedagogy. In many Teacher Education Institutions (TEIs), the lack of sufficient ICT skills among teacher educators themselves reduces the quality of training, and technology remains limited to occasional presentations. Although policy documents mention digital transformation, the lack of dedicated time, supporting personnel, technical support, and incentives for implementation often leads to a lack of motivation among teachers, and technology-rich Continuous Professional Development (CPD) fails to become a continuous process.

Implications for Teacher Readiness under NEP 2020

These challenges directly impact teacher readiness, because the kind of technologically proficient, innovative, and learner-centric teachers envisioned by NEP 2020 require more than just policy and curriculum changes—they need practical skills, habits, and a positive attitude. When Teacher Education Institutions (TEIs) lack adequate infrastructure and skilled mentors, pre-service teachers cannot learn to use digital tools hands-on; consequently, even after joining schools, they remain confined to the traditional chalk-and-talk method. Similarly, if Continuing Professional Development (CPD) programs at the in-service level are limited to formal seminars or certificate-based training, and there is no opportunity or support for using technology in daily classroom practice, then teacher readiness remains theoretical and does not translate into real-world classroom practice.
This means that to achieve the goals of NEP 2020, the challenges of digital transformation need to be viewed directly from the perspective of teacher readiness. By gradually overcoming these obstacles through infrastructure development, low-cost and low-bandwidth solutions, hands-on ICT-based practical training, peer-based digital learning communities, and the creation of a positive culture of technology use, teachers at both the pre-service and in-service levels can achieve the professional preparedness expected by NEP 2020.

Discussion

This review indicates that NEP 2020 has provided clear policy guidelines for enhancing teacher readiness at both pre-service and in-service levels through professional development and the integration of digital technology. Emphasis has been placed on technology-enriched, student-centered lesson planning, teaching, and assessment using platforms like DIKSHA and SWAYAM, along with a four-year integrated B.Ed. program and continuous CPD. However, various studies have shown that without adequate infrastructure, institutional support, and teacher confidence in using ICT, these policy measures cannot bring about the desired changes in real classrooms.

The entire discussion makes it clear that digital transformation can truly enhance teacher readiness only when three elements are present simultaneously: access (easy access to devices, internet, and platforms), skills (practical digital and pedagogical skills), and attitude (a willingness to learn, an innovative and positive mindset). Hands-on digital practicums and internships need to be strengthened in pre-service programs, and at the in-service level, instead of one-off workshops, a school-based, peer-supported, and continuous learning culture must be fostered. Working in this way, the digital and professional development goals of NEP 2020 will not remain confined to policy documents but will be effectively implemented in real teacher education.

Recommendations

In light of the NEP 2020, strengthening teacher preparation requires a more structured and context-sensitive integration of professional development and digital technologies at the practical level. The reviewed literature clearly indicates that the transformations declared in the policy document will only be effective when appropriate infrastructure, skills-based training, and a supportive professional culture are developed together at both the pre-service and in-service levels. In this context, the following recommendations are presented:

- Clearly include ICT-enriched courses, digital lesson planning, online/blended practicums, and the use of technology in school internships in every semester of the four-year B.Ed. program in pre-service teacher education.
- Develop a continuous, school-based, and peer-supported CPD model for in-service teachers, where digital pedagogy is directly linked to real-world classroom problems.
- Take initiatives to reduce the digital divide in rural and marginalized Teacher Education Institutions (TEIs) and schools by providing low-cost devices, reliable internet access, and digital content suitable for low-bandwidth environments.
- Offer specialized digital pedagogy training and mentorship programs for teacher educators so that they can themselves become role models for technology-enriched, student-centered teaching.
- Create opportunities for regularly sharing digital lesson plans, resources, and experiences by developing teacher learning communities (communities of practice) through both online and offline means.
- Include digital pedagogy as a significant indicator in institutional awards, recognition, and quality assessment criteria to encourage innovative initiatives in the use of technology.

Conclusion

The entire discussion makes it clear that NEP 2020 emphasizes professional development and the integration of digital technology as central components in restructuring teacher education, so that teachers at both pre-service and in-service levels can develop into skilled, innovative, and student-centered professionals equipped with 21st-century skills. While the policy document establishes a robust framework through four-year B.Ed. programs, continuous CPD, platforms like DIKSHA and SWAYAM, and professional standards like NPST, infrastructural limitations, the digital divide, and in many cases, a lack of ICT skills are preventing the full realization of this potential.

In this context, it can be said that simply adopting new policies is not enough to enhance teacher readiness; rather, it is crucial to simultaneously develop practical institutional support, a suitable digital environment, hands-on training, and a positive professional culture. By strengthening technology-enriched practicums in pre-service programs and school-based and peer-supported CPD activities at the in-service level, the digital transformation vision of NEP 2020 will not remain merely on paper but will be reflected in real classrooms, and the Indian teaching community will truly be prepared for the new era.

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