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From Chalkboards to Clicks: Rethinking Teacher Education in India

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Abstract: *The transition from traditional chalk-and-talk pedagogy to technology-enabled teaching has reshaped contemporary education systems worldwide. In India, national initiatives such as Digital India, SWAYAM, DIKSHA, and the National Education Policy (NEP) 2020 underscore the growing emphasis on digital integration in education. This shift places renewed responsibility on teacher education institutions to prepare future teachers for digitally enriched learning environments. The present study rethinks teacher education in India by examining the digital readiness of teacher preparation programmes, teachers' perceptions of digital professionalism, and institutional challenges in adopting emerging technologies. Employing a mixed-methods research design, data were collected through surveys, interviews, and curriculum analysis from selected teacher education institutions. The findings reveal notable gaps in curriculum alignment, technological infrastructure, and opportunities for continuous professional development. The study emphasizes the need to embed digital competence, innovative pedagogical practices, and ethical use of technology within teacher education curricula. The paper concludes with strategic recommendations to strengthen teacher preparation and support sustainable digital transformation in Indian schools.*

Keywords: *Digital Transformation, Teacher Education, Digital Competence, Digital Professionalism, NEP 2020, India.*

1. Introduction: Digital transformation has emerged as a defining feature of contemporary education systems worldwide, fundamentally altering the ways knowledge is accessed, delivered, and assessed. The integration of technologies such as learning management systems, virtual classrooms, artificial intelligence–based tools, and digital assessment platforms has shifted education from traditional chalkboard-based instruction to more interactive, learner-centered, and technology-mediated practices. In India, this transition has gained significant momentum over the last decade and was further accelerated by the COVID-19 pandemic, which compelled educational institutions at all levels to adopt online and blended modes of teaching and learning.

Within this rapidly evolving educational landscape, teachers occupy a central role in translating technological innovations into meaningful classroom practices. Effective use of digital tools requires not only technical proficiency but also digital pedagogy, ethical awareness, adaptability, and a commitment to lifelong professional learning. However, a considerable number of teachers enter the profession without adequate preparation to integrate technology effectively into teaching and learning processes. This gap highlights the growing need to re-examine the goals, structure, and practices of teacher education in India.

Teacher education institutions are entrusted with the responsibility of preparing future teachers to respond to changing educational demands. The National Education Policy (NEP) 2020 strongly advocates the use of technology to enhance access, equity, and quality in education, emphasizing digital capacity building, blended learning, and continuous professional development for teachers. Despite these policy directives, the integration of digital competencies within teacher education programmes remains inconsistent and uneven across institutions, often limited to theoretical exposure rather than practical application.

Against this backdrop, the present study seeks to critically examine the current status of teacher education in India in the context of digital transformation. It aims to explore the challenges, opportunities, and necessary reforms required to rethink teacher education so that future teachers are well-equipped to navigate and lead digitally enriched learning environments.

2. Review of Literature

The digital transformation of education represents a paradigm shift that goes beyond the simple use of technological tools and entails deep changes in pedagogy, curriculum design, and institutional practices. Kirkwood and Price (2014) argue that technology-enhanced learning becomes meaningful only when it is accompanied by pedagogical innovation that supports active, student-centered learning. Without such transformation, digital tools risk reinforcing traditional teaching practices rather than improving educational outcomes.

A significant contribution to understanding technology integration in teacher education is the Technological Pedagogical Content Knowledge (TPACK) framework proposed by Mishra and Koehler (2006). The TPACK model emphasizes the interdependence of content knowledge, pedagogical knowledge, and technological knowledge, suggesting that effective digital teaching requires teachers to balance and integrate all three domains. Subsequent studies have widely used this framework to assess teachers' digital competence and instructional readiness in technology-rich environments.

Research on teacher preparedness indicates persistent challenges in integrating digital tools into classroom practice. Ertmer and Ottenbreit-Leftwich (2010) found that while many teachers possess basic technological skills, they often lack confidence and pedagogical strategies for meaningful technology integration. This gap is particularly evident in developing contexts. In India, Singh and Sharma (2019) reported that teacher education programs continue to rely on rigid curricula, limited hands-on digital training, and inadequate technological infrastructure, thereby restricting student teachers' exposure to innovative teaching practices.

Emerging literature also highlights the importance of digital professionalism in teacher education. This includes ethical technology use, data privacy, online communication norms, and responsible engagement in digital spaces. Scholars argue that teacher preparation programs must address not only technical proficiency but also professional values and ethical awareness to prepare teachers for digitally mediated learning environments. Overall, the literature underscores the need to rethink teacher education in India by embedding pedagogically sound, ethically grounded, and contextually relevant digital practices.

3. Objectives of the Study: The present study is undertaken with the following specific objectives:

1. To examine the extent of digital readiness in teacher education programmes in India, with special reference to curriculum design, pedagogical practices, and institutional infrastructure.
2. To analyse teachers' perceptions towards digital competence and digital professionalism in the context of technology-enabled teaching and learning environments.
3. To identify the major challenges faced by teacher education institutions in integrating emerging digital technologies and aligning teacher preparation with the goals of NEP 2020.

Methodology: The present study adopts a descriptive and analytical research design based exclusively on secondary data to examine digital readiness, teachers' perceptions of digital competence, and challenges in integrating emerging technologies in teacher education in India. A secondary-data-based methodology is considered appropriate as the study aims to synthesise existing knowledge, policy documents, and empirical research related to digital transformation in teacher education, particularly in the context of the National Education Policy (NEP) 2020.

The study is qualitative in nature, supported by limited quantitative indicators reported in earlier studies and national surveys. Emphasis is placed on interpreting trends, patterns, and policy directions rather than generating primary numerical data. The analysis is aligned with the three stated objectives of the study.

Sources of Data (Secondary Data): The secondary data for the study were collected from a wide range of authentic and reliable sources, including:

- Policy documents and reports published by the Government of India, such as the National Education Policy (NEP) 2020, NCTE regulations, and Ministry of Education reports.
- Reports and databases from national and international agencies such as UNESCO, World Bank, and OECD related to digital education and teacher professional development.
- Research articles published in peer-reviewed national and international journals focusing on teacher education, digital pedagogy, and educational technology.
- Books, edited volumes, and conference proceedings related to digital transformation in education.
- Official portals and digital platforms such as DIKSHA, SWAYAM, and Digital India initiatives for contextual understanding.

Method of Data Collection: Data collection involved a systematic review of literature and documents. The researcher followed these steps:

1. Identification of keywords such as *digital readiness*, *teacher education*, *digital competence*, *digital professionalism*, *NEP 2020*, and *emerging technologies in education*.
2. Selection of relevant documents and studies based on their relevance to the objectives of the study.
3. Careful reading, classification, and organisation of collected material under thematic categories corresponding to the objectives.
4. Verification of sources to ensure credibility and academic validity.

Technique of Data Analysis: The secondary data collected for the present study were analysed using thematic analysis and content analysis techniques. The analysis was conducted in accordance with the stated objectives of the study.

For Objective 1, data pertaining to digital readiness in teacher education were examined by identifying and analysing themes related to curriculum design, pedagogical practices, and institutional infrastructure.

For Objective 2, findings from earlier empirical studies were synthesised to analyse teachers' perceptions, attitudes, and levels of digital competence and professionalism in technology-enabled teaching–learning environments.

For Objective 3, major challenges and constraints associated with the digital transformation of teacher education were critically examined through a review of relevant research literature and policy documents.

A comparative and interpretative approach was adopted to derive meaningful inferences from the analysed data. Further, triangulation of findings from multiple sources was employed to enhance the validity and reliability of the conclusions drawn.

5. Data Analysis: Quantitative data collected through questionnaires were analyzed using descriptive statistics such as percentages and mean scores. These analyses helped identify patterns in teachers' digital competence and attitudes toward technology.

Qualitative data from interviews and document analysis were analyzed thematically. Codes were generated to identify recurring themes related to digital preparedness, institutional support, curriculum design, and professional development. The findings from different data sources were compared to identify consistencies and discrepancies.

6. Findings and Discussion: The findings revealed that most teachers possessed basic digital skills, such as using presentation software, online communication tools, and digital resources. However, only a limited number of teachers reported confidence in integrating technology effectively into their pedagogy.

Infrastructure limitations, particularly in rural areas, emerged as a significant challenge. Teachers reported inadequate access to devices, unreliable internet connectivity, and lack of technical support. Teacher educators highlighted that existing curricula provided minimal opportunities for hands-on experience with emerging technologies.

The study also found that digital professionalism was not explicitly addressed in most teacher education programs. Issues related to ethical technology use, online safety, and professional conduct in digital spaces were largely overlooked. These findings align with previous research emphasizing the need for holistic digital competence development in teacher education.

7. Suggestions of the Study: Based on the findings, the following suggestions are proposed:

1. Teacher education curricula should incorporate hands-on digital pedagogical training rather than focusing only on theoretical ICT components.
2. Continuous professional development programmes should be organised to enhance digital competence and confidence among teacher educators and student teachers.
3. Institutions should be supported with improved digital infrastructure, especially in rural and underserved areas.
4. Digital professionalism, including ethical and responsible technology use, should be explicitly included in teacher education frameworks.
5. Strong monitoring mechanisms are required to ensure effective implementation of NEP 2020 provisions related to digital education.

8. Conclusion: The transition from chalkboards to clicks represents a significant shift in the landscape of teacher education in India. The present study highlights that while policy initiatives and digital platforms have created a favourable environment for digital transformation, the actual preparedness of teacher education programmes remains a work in progress. Digital readiness, teachers' perceptions, and institutional challenges are closely interconnected and require a holistic approach.

To realise the vision of NEP 2020, teacher education must move beyond policy rhetoric to meaningful practice. Strengthening digital competence, fostering digital professionalism, and addressing infrastructural and pedagogical gaps are essential for preparing teachers capable of meeting the demands of 21st-century

classrooms. A sustained and coordinated effort from policymakers, institutions, and educators is crucial to ensure that digital transformation in teacher education leads to equitable and effective educational outcomes.

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