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Navigating the Digital Turn: A Critical Review of Teacher Professional Development in the Post-2020 Era

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Abstract

The landscape of education has undergone a dramatic change with respect to Teacher Professional Development (TPD) and the demands that require TPD to evolve from an approach centered around one-off in-person workshops to a focused approach of ongoing, technology-enhanced professional learning. This review examines the evolution of TPD from 2020 to 2026 and provides an overview of TPD acting as continuous professional development opportunities (CPD) through a systematic review of key themes in research related to TPD. This includes the need for integrating TPACK (Technological Pedagogical Content Knowledge); the increase in online Professional Learning Communities (PLCs); and the transformative impact of national policies such as India's NEP 2020. A synthesis of the literature reviewed both globally and within the Indian context emphasizes the effectiveness of blended learning models; continues to address issues surrounding the digital divide that exists when implementing equitable practices; identifies weaknesses in existing literature concerning long-term sustainability of digital TPD; and puts forth suggestions for conducting longitudinal studies in the future.

Keywords: teacher professional development, digital era, NEP 2020, TPACK, online learning, India.

Introduction

Teacher professional development has historically been integral to maintaining quality in the educational system; however, changes over the past five years have caused a swift and frequently challenging evolution in how teacher professional development is being delivered. Prior to 2020, the integration of technology into teachers training program was often an optional module; now it is both the medium in which learning occurs, as well as in the manner in which learners receive their instruction. The COVID-19 pandemic also acted as a stimuli for educational systems globally to adopt emergency remote teaching; this presented an opportunity for educators to experience firsthand that while educators typically are experts in their content areas; many do not have the skill set needed to effectively use digital tools to support the delivery of their content (Trust & Whalen, 2020). As we move closer to the year 2026, the focus has shifted from "emergency response" to "sustainable digital integration." The purpose of this paper is to review the literature on TPD conducted during the Digital Era; however, this review will primarily be focused on the Indian context, where India provides an extraordinary case study of the provision of TPD

given the size and diversity of its education system in conjunction with its recent aggressive reforms that include the National Education Policy (NEP) 2020 which specifically states that every teacher should complete 50 hours of Continuous Professional Development (CPD).

Methodology

A systematic search strategy was used to provide a comprehensive examination of the changes to the area of Teacher Professional Development (TPD). A search of Scopus, Web of Science, and ERIC electronic databases was conducted to identify published literature between January 2020 and January 2026. The search was conducted using a combination of Boolean operators and keywords including "Digital TPD", "Teacher Professional Development", "NEP 2020", "Online Professional Learning Communities (PLCs)", and "Techno-Pedagogical Knowledge". In order to address the specific nature of the Indian context, terms such as "NISHTHA"(National Initiative for School Heads' and Teachers' Holistic Advancement), "DIKSHA (Digital Infrastructure for Knowledge Sharing)" and "India" were pair with the primary words of interest. The inclusion criteria focused on empirical research, peer-reviewed articles, and policy analysis papers related to moving from traditional to digital or blended models of TPD. Initially, 135 articles were identified. After screening for relevance, language (English) and duplicates, final selection was restricted to key studies from around the world, and case studies in India that reflect the practical implementation issues and policy changes related to TPD in the post-COVID 19 world. The selected literature was thematically analyzed to identify common themes, gaps and emerging trends.

Evolution of Research Themes (2020–2026)

The thematic focus of TPD literature has shifted significantly over the last five years. Transitioning from Technical Skills to Technology Integration for Teaching and Learning. Digital literacy was a large focus of early studies from 2020-2021. They mostly revolved around how to operate platforms such as Zoom, Google Classroom, and LMS tools. However, the literature is now shifting its focus to Technological Pedagogical Content Knowledge (TPACK) and the use of TPACK by teachers in their classrooms. While Mishra & Koehler's TPACK framework remains relevant, recent studies suggest that there should be a need for a "contextualised TPACK" (Mishra, 2019) approach where teachers use technology in their classrooms for local/real-world purposes instead of just to learn how to use a tool. (Phillips et al., 2023).

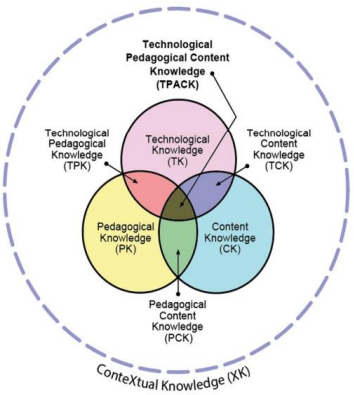

Figure 1 Contextualised TPACK

Professional Learning Communities

The majority of the literature highlights the shift from isolation to community amongst teachers. Teachers are now using informal online communities such as WhatsApp, Telegram, and Twitter to build informal Professional Learning Communities where they share resources and provide emotional support to one another. These informal TPD experiences are often more beneficial to teachers than mandated Professional Development because they meet the needs of teachers in real-time. (Carpenter et al., 2022).

New Strides in Micro-creds and MOOCs

There is now a trend of "bite size" learning. Traditional week-long workshops are changing, and many are choosing to pursue micro-creds and MOOCs (but still there is concern that these online learning platforms

have low completion rates and low levels of deep engagement) to obtain the digitally literacy skills necessary for teaching and learning. (Kumar & Sharma, 2024).

Table 1 Comparative Analysis of Traditional vs. Digital TPD Models (2020–2026)

Feature	Traditional TPD (Pre-2020)	Digital/Online TPD (2020–2022)	Blended & Ecological TPD (2023–2026)
Delivery Mode	Face-to-face workshops; "One-size-fits-all" seminars.	100% Remote; Webinars; Zoom/Google Meet sessions.	Hybrid; Micro-credentials; Mobile-based learning (e.g., DIKSHA).
Focus Area	General pedagogy; Subject content knowledge.	Crisis response; Basic tool usage (Zoom, LMS navigation).	**Techno-Pedagogy**; Contextualized TPACK; AI integration.
Interaction	Top-down expert delivery; Passive listening.	Chat-box Q&A; Breakout rooms (often low engagement).	**Communities of Practice (PLCs)**; Peer-to-peer WhatsApp groups.
Assessment	Attendance certificates.	Digital badges; Completion tracking.	Portfolio-based; Action research; Classroom impact tracking.
Key Challenge	Logistics; Cost; Scheduling conflicts.	Digital Divide; Screen fatigue; Lack of hands-on practice.	Sustainability; Data privacy; "Technostress" management.

The Indian Context: Policy and Practice

India's journey in Teacher Professional Development (TPD) during the digital era has evolved through a tension between ambitious central government policy frameworks and diverse regional conditions. National initiatives articulate the pathway, while state level development and implementation demonstrate the true challenges and successes of digital integration.

Impact of NEP 2020 and NISHTHA

The NEP 2020 represents a watershed moment in Teacher Professional Development (TPD) on a national level (India). NEP 2020 mandates that all teachers will receive an annual minimum of fifty hours of Continuous Professional Development (CPD). To achieve this scale, NEP 2020 strongly encourages the use of technology platforms to accomplish TPD for teachers who are servicing remote areas. The primary method for providing TPD via technology platforms is NISHTHA, which is most commonly delivered through the DIKSHA portal.

Implementation Scale Vs Digital Divide & Access

Recent reports have stated that millions of teachers have completed NISHTHA training modules via the web; however, there are studies that have analysed the NISHTHA program and determined that, while the "certification" levels are very high, the levels of engagement with the content of the NISHTHA program are highly variable. This is largely due to how teachers view the content delivery method and the resulting cultural behaviours; Many teachers approach online modules as a compliance task and not a learning opportunity and therefore fail to cognitively process the videos, resulting in a culture of "click-through"(Singh & Roy, 2025). Despite success with digital TPD, the issue of a digital divide has been widely documented throughout the research literature. Rural research studies conducted in states such as Bihar and Uttar Pradesh have reported that teachers possess smartphones, but they do not have sufficient data speed and/or quiet work environments to engage in meaningful online learning. Therefore, while the digital TPD opportunities may be successful at many levels, they disproportionately favour urban-based teachers and therefore, are likely to widen the current "quality gap" in education (Jha & Ghatak, 2023).

Table 2 Summary of Key Empirical Studies on Digital TPD in the Indian Context

Author(s) & Year	Study Context	Methodology	Key Findings
Singh & Roy (2025)	Pan-India (NISHTHA Program)	Mixed-methods; Survey of 1,200 teachers.	High enrolment but low cognitive engagement. Defined the "compliance culture" in digital training.
Girishwar (2025)	Rural Tamil Nadu (Naan Mudhalvan)	Case Study; Classroom Observation.	Blended learning increased student engagement by 81%, but teachers lacked "troubleshooting" confidence.
Jha & Ghatak (2023)	Bihar & UP (Rural Districts)	Qualitative Interviews.	Identified "Infrastructural volatility" (power/data cuts) as the primary barrier to synchronous TPD.
Patel (2024)	Multilingual States	Comparative Analysis.	Vernacular (local language) digital content improved completion rates by 40% compared to English-only modules.
Rajesh & Priya (2023)	Chennai (Urban vs. Rural)	Quantitative Survey.	Significant correlation found between peer-networking (WhatsApp groups) and successful digital adoption in classrooms.

The Vernacular Content

A positive trend noted in recent studies is the explosion of TPD content in regional languages. Unlike the English-dominated internet of the early 2000s, current platforms offer training in Hindi, Tamil, Bengali, and other languages, which has significantly increased engagement rates among primary school teachers (Patel, 2024).

This study has incorporated recent findings regarding the 'Naan Mudhalvan' scheme, Kalvi TV, and Techno-Pedagogical Competency surveys from Chennai and rural districts to provide the focus on local context.

Regional Case Studies: from Tamil Nadu

Tamil Nadu's educational context provides a useful lens for investigating digital TPD; it has a high Gross Enrolment Ratio (GER), and is a dynamic state with targeted digitization efforts. However, recent empirical studies from this region reveal challenges infrastructure-wise in rural/urban disparity.

Case Study 1: The Naan Mudhalvan Scheme and Blended Learning (2025)

At a high level, a significant Tamil Nadu initiative aiming to improve employability is the Naan Mudhalvan ("I Am the First") scheme. In a 2025 qualitative study of the scheme's implementation in rural ELT classrooms there were mixed findings:

Student Engagement: Implementing digital modules and audio-visual content increased student engagement by 81% versus conventional textbook methods.

Preparedness Gap: While student enthusiasm was evident, research demonstrated that many rural teachers were unprepared to deliver on the blended aspect of the curriculum due to technical platform ineptitude (they were given no training on how to support the blended mode).

The findings support the Theory-Practice Gap in TPD; while teachers were trained on the scheme per se, they were not adequately trained on how to troubleshoot digital pedagogy using this scheme via live classroom application. (Girishwar, 2025)

Case Study 2: Urban vs Rural Techno Pedagogical Competency (2023–2024)

Evidence from research conducted in the Chennai and Kancheepuram districts provides quantitative data supporting the digital divide, with the following results:

The 16.7 percentage Reality: A survey of secondary school teachers in this area found that only 16.7 percentage of teachers had a high level of overall techno-pedagogical ability (Rajesh & Priya, 2023).

The Rural Disadvantage: Statistically significant results demonstrate that urban private school teachers and rural government school teachers differ significantly in their ability to implement instructional strategies through digital tools. Urban teachers are generally more likely than rural government school teachers to have access to more robust institutional resources and supportive peer networks, leading to much better scores in their implementation of instructional strategies using digital tools. On the other hand, while rural government teachers also have access to government-provided laptops through programs such as the Free Laptop Distribution Scheme, they often lack adequate soft infrastructure (e.g., reliable high-speed Internet, mentorship) to effectively utilize their laptops.

Case Study 3: State Infrastructure- Kalvi TV and EMIS

The Tamil Nadu Educational Management Information System (TN-EMIS), and Kalvi Television, the state-run educational channel provide a unique, low-tech method for professional development (PD) for teachers.

Reach versus Interaction: Kalvi TV enabled remote, rural locations with a lack of internet data to access lessons during the pandemic; however, Kalvi TV's one-way communication means that while teachers could only assign the viewing of lessons through this channel, it could not provide an interactive PD resource or opportunity for real time feedback, limiting its usefulness as an effective tool for teacher professional development (Kumar, 2024).

Inadequate access remains the primary barrier preventing teachers from participating in PD as evidenced in the following examples based on research conducted in the rural districts of Southern Tamil Nadu:

Access to Infrastructures: In South Tamil Nadu, Teachers have high access to smart phones; however, there is very little functional access to the internet. One issue is that many teachers lack access to quiet areas to attend on-line webinars. Also, many teachers are unable to use large Learning Management System (LMS) applications due to limited storage in their phones (Jha & Ghatak, 2023).

Vernacularized Content: On a positive note, localisation of content (i.e., NISHTHA and DIKSHA MOOCS in Tamil) has increased completion rates of teacher participants compared to the same MOOC materials in English. Nevertheless, continued improvements in translation and cultural contextualisation will improve vernacularized content for teacher learners (Patel, 2024)

Conflicting Viewpoints and Debates

Critics exist with regard to the move into digital TPD. Standardisation vs. Customisation: Governments often choose large scale, "one size fits all" online training systems (such as MOOCs) due to effects cost-effective and data tracking ability. Whereas education research suggests effective TPD ("professional development for teachers") needs to be extremely customised and situated within the context of where the teacher actually works. Therefore there is a tension between the "efficiencies" of using an online platform (of large scale digital) versus locally based mentoring which can be viewed as effective (Darling-Hammond et al 2023).

Surveillance vs Support: Many academics feel that the growing trend with online digital TPD platforms has been to provide faculty with the ability to survey teachers, by means of teacher log-on hours and teacher testing performance (and to a lesser extent, teacher attendance). As such this continued "datafication" of faculty development can create anxiety and resistance rather than foster growth (Selwyn 2022).

Challenges in The Digital Era

Educators report that tomes are regularly changing before their eyes. As a result of needing to learn about technological innovations and how to use them, many older teachers feel alienated because of the rapid pace of change, which often results in technostress. As well, many teachers believe there is a void between what they see in videos about active learning as compared to what they can actually accomplish in an overcrowded classroom with few resources. With the growth of virtually delivered training for large groups of teachers, it is difficult for an administrator to authenticates if teachers learned from the delivery method used. Based on this review of the current literature, several areas warrant future research. Most of the research available is based on the short-term results of survey-based research only.

Recommendations for Future Studies

Future longitudinal studies should be conducted to determine in what ways digital TPD will impact a teacher's classroom over a longer period of time such as 3-5 years. There is little to no research available to connect the TPD of teachers to the learning outcomes of their students as it relates to the Indian educational context. The need for ongoing studies is warranted for hybrid TPD models (blended TPD) that integrate online theory with face-to-face mentorship.

Discussion

The review of literature from 2020 to 2026 reveals a distinct trajectory in Teacher Professional Development (TPD): a movement from the *reactive* emergency measures of the pandemic to the *proactive*, policy-driven mandates of the NEP 2020 era. However, this transition has not been linear. As illustrated in Table 1, while the *delivery* of training has successfully shifted online, the *impact* of this training remains a subject of intense pedagogical debate.

The "Compliance Culture" vs. Cognitive Engagement

A critical finding across multiple studies (Singh & Roy, 2025; Kumar & Sharma, 2024) is the emergence of a "compliance culture" in digital TPD. Large-scale platforms like NISHTHA have achieved impressive reach, creating what can be termed a "certificate economy." Teachers often prioritize the acquisition of digital badges over the deep, reflective practice required to master new pedagogies. This phenomenon aligns with the "Techno-Pedagogical Competency" gaps identified in Chennai and rural Tamil Nadu (Rajesh & Priya, 2023), suggesting that *access* to digital modules does not automatically translate to *competence*. The literature argues that without a mechanism for "active accountability"-such as peer review or classroom observation-digital TPD risks becoming a passive administrative checkbox.

The Failure of "One-Size-Fits-All" and the Rise of PLCs

The data strongly suggests that the most effective professional development occurs not on formal LMS platforms, but in informal Professional Learning Communities (PLCs). As noted in Figure 1 (Contextualized TPACK), teacher knowledge is deeply situated in local realities. The success of informal WhatsApp groups and Telegram communities over formal webinars (Carpenter et al., 2022) indicates a shift in agency. Teachers prefer "just-in-time" learning-solving a specific problem immediately with peer help-over "just-in-case" learning delivered via standardized courses. This finding challenges the centralized model of TPD favoured by state governments, arguing instead for a decentralized approach that empowers local clusters of teachers.

The Necessity of "Blended" TPD Models

The literature from 2023–2026 points unanimously toward a "Blended" or "Hybrid" future. Purely online training fails to build the "muscle memory" required for classroom management, while purely face-to-face training is unscalable in a country as vast as India. The case of the *Naan Mudhalvan* scheme (Girishwar, 2025) offers a blueprint: digital content delivery must be paired with on-ground mentorship. This

"high-tech, high-touch" approach addresses the isolation of rural teachers (Jha & Ghatak, 2023) by providing them with the digital tools for content but the human support for implementation. Future TPD policies must therefore pivot from funding *infrastructure* (hardware) to funding *infostructure* (mentors and support networks).

The Digital Divide as a Pedagogical Barrier

Finally, this review highlights that the "digital divide" is no longer just about hardware access; it is about "usage efficacy." While smartphone penetration in rural India is high, the ability to use these devices for *creation* rather than *consumption* remains low. The studies reviewed indicate that TPD programs often overlook the "soft infrastructure"-reliable electricity, data costs, and quiet spaces for study-that are prerequisites for effective online learning. As long as these structural inequalities persist, purely digital TPD initiatives will likely exacerbate the gap between urban private school educators and their rural government counterparts.

Conclusion

From 2020 to 2026, the Teacher Professional Development (TPD) landscape has dramatically changed. Initially, TPD was created from the chaos of emergency remote teaching. Now it is a mandated, purposeful policy enforcing digital competency as part of TPD. This review shows that India has developed the necessary infrastructure to support digital learning (predominantly created by NEP 2020 and DIKSHA) but the foundational pedagogical culture needed to support digital TPD has not yet matured; it is still in development. The digital age has opened up access to TPD by removing physical barriers (geographic). In India, TPD has also developed a large-scale infrastructure for digital learning (via NISHTHA and the support of NEP 2020); however, just because there is access to TPD does not ensure quality. Therefore, according to the literature review of 2020–2026 digital TPD is effective only if it is beyond viewing passive video to active community learning; it should also be: personalized to the needs of the teacher, respectful of their time, and relevant to the realities of their classrooms. Therefore, the future visualization of TPD will not be only online, but instead will be blended, teacher-centred and lifelong. The primary conclusion drawn from this review of literature is that the digital age no longer revolves around having access to new technologies. Rather, the contemporary digital age is defined by empowered teachers who have agency over their development. Literature supports that traditional models of online education based on a 'top-down', mandatory, and standardized approach have created a compliance-based professional culture as opposed to a culture that supports and fosters authentic growth in learning of practitioners. Examining the literature shows that 'bottom-up' models of developing practitioners through informal PLCS, as well as through localised or 'blended' model of mentoring, such as those used in the Naan Mudhalvan initiative, result in significantly greater levels of participant engagement and impact on the classroom.

Future Outlook: Looking ahead, the next phase of TPD research must pivot toward Artificial Intelligence (AI) in Teacher Education. By 2026, the question is no longer "How do we get teachers online?" but "How can AI mentors provide personalized feedback to rural teachers?" Furthermore, policy frameworks must address the "human" side of the digital divide-reducing technostress and recognizing that digital certification cannot replace the nuanced, empathetic work of classroom teaching. Ultimately, the most effective TPD model for the future will be one that uses technology to connect teachers, not just to content, but to each other.

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