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“Building Strong Foundations with Technological-Pedagogical Knowledge System for Women Teacher Empowerment under NEP 2020.”

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Abstract

Empowering women teachers with knowledge and skills in the 21st century is crucial for realizing the inclusive and equitable vision of **India's National Education Policy (NEP) 2020**. Women make up a significant contribution in Indian school education as a teacher, especially at the primary and elementary levels. However, women teachers are frequently have trouble advancing in their careers because they don't have enough access to technology, in-service training and pedagogical experiences, beside this gender biasness, and don't get enough support from their school's administration, and colleagues as well. This paper investigates the establishment of robust foundations of **Technological-Pedagogical Knowledge (TPACK)** framework, which may act as a foundation stone for the empowerment of female teachers, under NEP 2020s recommendations. This paper will also be discussed with the weave of technology, pedagogy, and material knowledge in the teaching system, that not only improves the quality of teaching but also fosters knowledge, skills, competencies, confidence, and leadership among female educators. Using national initiatives like **DIKSHA**, **SWAYAM**, and **NISHTHA** are beneficial for them, the ongoing debate shows how women teachers can break down institutional obstacles, keep learning new things, and make a real difference in digital and inclusive education dual responsibilities. The paper concludes that sustained empowerment requires both systemic and human dimensions, integrating policy-level initiatives with individual capacity enhancement and socio-cultural change accordingly.

Keywords: *Women Teachers Empowerment, NEP 2020, Technological Pedagogical Content Knowledge (TPACK), technology in Education, Digital Literacy, Teacher Professional Development, Gender Equality, Inclusive Education.*

1. Introduction

India's educational reform program is about to undergo a significant transformation with the implementation of the **National Education Policy (NEP) 2020**. In order to promote critical thinking, creativity, and lifelong learning, it envisions an educational system that is both more equitable and inclusive, integrating technology. Educators, designated as “the heart of the learning process” in the policy, are pivotal to this transition knowledge.

The number of women who are employed as teachers in India is close to fifty percent, and the percentage of women who are employed in early school grades is considerably higher. Not only do women educators play a crucial part in the transmission of information, but they also play a role in the role of “role models” who motivate future generations of females to seek education and leadership. Despite their substantial presence, women teachers often encounter systemic obstacles,

including limited access to information and communication technology (ICT), insufficient professional training, societal pressures regarding work-family balance, remote assignments with inadequate infrastructure, and a deficiency of confidence in digital environments.

The NEP 2020 offers a valuable opportunity to address these challenges through the enhancement of teacher empowerment via the integration of technology and ongoing professional development. Women teachers empowerment, in this context, pertains to the improvement of their technological-pedagogical expertise, professional autonomy, and capacity to develop learning experiences that conform to contemporary educational standards. The Technological-Pedagogical Content Knowledge (TPACK) framework offers a theoretical and practical foundation for understanding the effective integration of technology into teaching methodologies and subject matter by educators. For women teachers, mastery of TPACK can serve as a foundation for empowerment, strengthening professional confidence, leadership capacity, and equitable participation in the digital transformation of education.

2. Understanding The Technological-Pedagogical Knowledge TPACK System

The **TPACK framework** (Mishra & Koehler, 2006) builds upon Shulman's (1986) concept of **Pedagogical Content Knowledge (PCK)** by incorporating the dimension of technology. It places an emphasis on the relationship between three different knowledge domains:

- i. **Content Knowledge (CK):** a complete understanding of the material that is being taught.
- ii. **Pedagogical Knowledge (PK):** about the Knowledge of student learning, teaching, assessment, and classroom administration.
- iii. **Technological Knowledge (TK):** How to use digital learning tools, platforms, and new technologies should already be known to you.

The integration of these domains results in **Technological Pedagogical Content Knowledge (TPACK)**, an all-encompassing comprehension that enables educators to create learning environments that are not only effective but also engaging and supported by relevant technology in the classroom learning atmosphere, digital inclusion, career mobility, and self-reliance are made possible by TPACK, which is more than just a theoretical concept for women teachers, particularly in rural and semi-urban schools instructional settings.

3. Women Teacher Empowerment, The Vision of NEP 2020 Context

NEP 2020 wants to change the way schools work so that teachers have more freedom, keep learning new skills, continuous professional development (CPD), and use technology in both teaching and learning. this makes it clear that gender equality and inclusion are important, making sure that women educators have the same chances to grow and lead as men.

Provisions included:

- i. A **four-year integrated B.Ed. programme (ITEP)** to professionalize teacher education, and include teacher profession as a dream profession by choice.
- ii. Establishment of **National Professional Standards for Teachers (NPST)**.
- iii. Continuous online and offline **professional development** through platforms like **DIKSHA, SWAYAM, NMM of NCTE and NISHTHA**.
- iv. Emphasis on **technology-enabled learning** and **digital literacy**.
- v. **Leadership opportunities** for women teachers in school administration and policy.

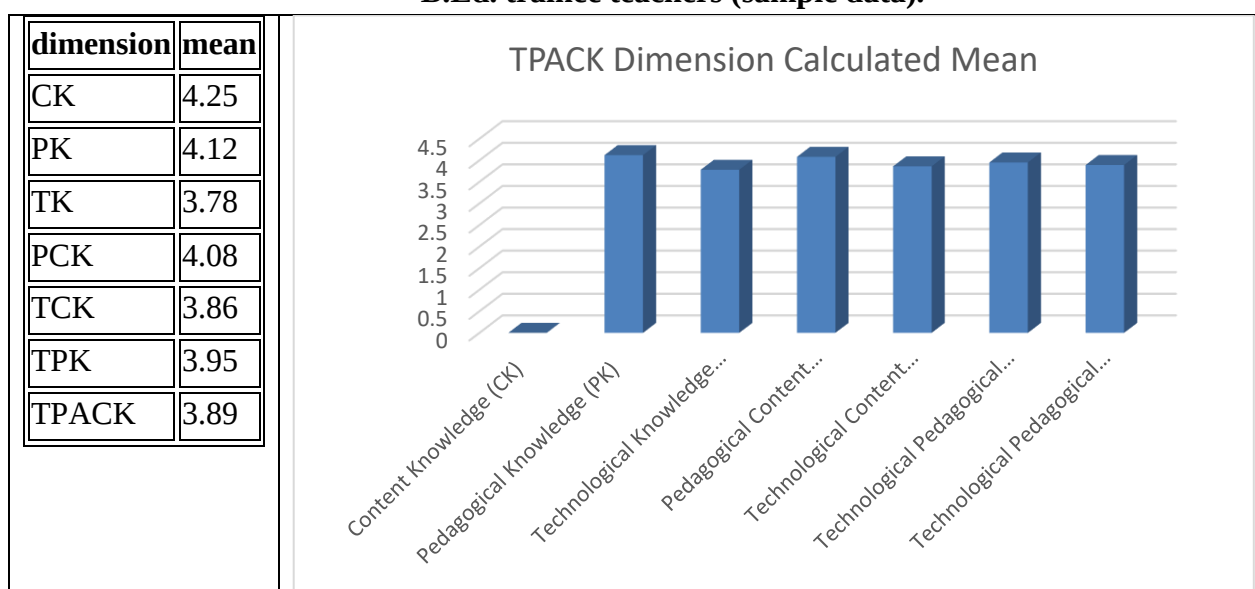
These programs make it easier for women teachers to move on in their careers, as long as they have the technology and teaching skills to keep up with the changing world of teaching and learning process in Indian knowledge system.

For TPACK our investigation carried out a research paper entitled “**Building Strong Foundations with Technological-Pedagogical Knowledge System for Women Teacher Empowerment under NEP 2020**” where we used self-prepared questionnaire for a **TPACK** (Technological Pedagogical Content Knowledge). The 100 trainee teachers were selected of different B.Ed., pre-service and in-service teachers of different B.Ed., colleges at Bidar district of Karnataka.

Table 1. Mean Scores of TPACK Components among women B.Ed. Trainee Teachers (N = 100)

TPACK Dimension	Mean	Standard Deviation	Interpretation
Content Knowledge (CK)	4.25	0.48	High
Pedagogical Knowledge (PK)	4.12	0.51	High
Technological Knowledge (TK)	3.78	0.62	Moderate
Pedagogical Content Knowledge (PCK)	4.08	0.49	High
Technological Content Knowledge (TCK)	3.86	0.57	Moderate
Technological Pedagogical Knowledge (TPK)	3.95	0.54	High
Technological Pedagogical Content Knowledge (TPACK)	3.89	0.56	High

Mean Scores of TPACK Components, Average scores of seven TPACK dimensions among 100 B.Ed. trainee teachers (sample data).



Interpretation

The findings indicate that B.Ed. trainee teachers possess strong **Content Knowledge (M = 4.25)** and **Pedagogical Knowledge (M = 4.12)**. Their **Technological Knowledge (M = 3.78)** is comparatively lower, suggesting the need for additional ICT training. The overall **TPACK score (M = 3.89)** reflects a high level of competence in integrating technology, pedagogy, and content knowledge into classroom teaching. These results suggest that teacher education programmes are fostering integrated

teaching competencies, although further emphasis on technological proficiency could enhance classroom readiness, but TPACK knowledge needs more improvements among B.Ed. in-service and pre-service students,

4. Building TPACK's strong foundation

4.1 Integration of TPACK teachers pre-service and in-service programme

Teacher Education Institutions (TEIs) must serve as catalysts for digital and pedagogical innovation. Implementing TPACK principles in pre-service teacher education for women teacher trainees ensures lasting empowerment via knowledge and skills, which may encompass:

The Approach:

- **ICT-Based Curriculum:** Technology should be incorporated throughout all disciplines, not only in a separate "ICT course."
- **Digital Course Content:** Women trainees should use PowerPoint, Google Classroom, and simulations for micro-teaching.
- **Collaborative Online Learning:** LMS-based peer groups boost confidence and cooperation among female teacher trainees.
- **Digital Portfolios:** Encourage trainees to create e-portfolios including instructional plans, reflections, and technical discoveries.

Similarly:

At a college for women teachers in "Bidar," B.Ed. students utilized Canva and Google Slides to construct digital storybooks to help youngsters learn English. They got better at using technology, teaching language, and working together because of the project. NCTE also emphasises to establishes language labs and computer labs alongside all other labs.

4.2 Continuous Professional Development for In-Service Women Teachers

Women educators currently in the workforce need ongoing opportunities for professional development and networking facilitated by technology for which we can use **Effective CPD Practices:**

- i. **Blended Learning Models:** Combining online learning platforms like MOOCs (Indian SWAYAM) with school-based workshops etc.
- ii. **Mentorship Programs:** Senior women educators guiding junior teachers through virtual mentoring under the **National Mission for Mentoring (NMM)**.
- iii. **Professional Learning Communities (PLCs):** Creating virtual spaces on platforms such as DIKSHA or WhatsApp for sharing digital lessons and experiences.
- iv. **Recognition and Incentives:** Encouraging participation through certification, promotions, and digital badges.

Example:

"A group of female teachers from Assam successfully finished an online NISHTHA module focused on "ICT in Classroom Pedagogy" and collaboratively developed e-content in both Assamese and English for multilingual learners as in Karnataka as well. Their resources were subsequently disseminated across the state, illustrating the multiplier effect of empowerment."

4.3 Technology as a Tool for Gender Equality

Digital technologies may help women teachers to get overcome from professional problems they faced in the past. Women can manage their job and family lives, accordingly, thanks to online in-service professional courses, remote cooperation, and flexible employment possibilities.

Example:

“A teacher in remote area of Bidar Karnataka, with limited mobility, now she used DIKSHA portals self-paced programme to complete Continuous Professional Development (CPD) requirements from home, and enhancing her pedagogical confidence and earning a leadership quality and get a role as ICT coordinator in her school.”

5. Discussion: The Connection Between Technology, Teaching, and Women's Rights

5.1 Knowing how to utilize technology to us it oneself

Digital literacy is about to be a fundamental technical ability, while digital use is about, women's being able to utilize technology in a purposeful atmosphere of teaching, learning, and professional advancement. When women instructors gain digital literacy, they believe they can use technology to develop, lead, and come up with new ideas and use it accordingly.

Example:

“Women teacher in Bidar used social media to share lesson with their students, during COVID-19 lockdowns, reaching towards thousands of students in the said pandemic and building confidence in their professional identity.”

5.2 Fostering Leadership through TPACK

According to NEP 2020, women teachers are very important in present school learning communities. Especially for women, TPACK skills can help them become Good Teacher and lead the teaching learning situations as a leaders, whether they need to become a teachers, material creators, or ICT supporters in schools.

Example:

“A headmistress in Bidar initiated a blended learning programme integrating Google Classroom and offline learning communities. Her initiative was recognized by the State Council of Education, this is motivating other women teachers to introduce similar programme in other districts.”

5.3 Promoting Inclusive Pedagogy

Women teachers are very good at getting along with students and showing empathy. Kids with disabilities, girls' students who live in rural areas, or speak a different language may be among them when they have access to technology.

Example:

“Text-to-speech software and pictures were used by a women teacher in school in Bidar, to help girls who couldn't see learn Science. students could understand things better because of the different ways she taught, and she inspired them to create a digital environment class.”

5.4 Collaborative Learning

Digital networks help women teachers who feel less alone and more linked to their peers. Webinars, digital workshops, and making open educational resources (OER) with other people could help women teachers to learn more and feel better about their skills.

Example:

Women teachers from all around India worked together to produce digital modules on gender sensitivity and climate education via the SWAYAM-NMMC-NCTE, Teachers' Forum. This cooperation gave them a bigger concept and voice at the national conversation programme about education.

5.5 Problems

Things are still challenging for women instructors, but they are getting better:

- **Techno-Gap:** Women who live in rural or tribal regions sometimes don't have access to reliable internet or electronics.
- **Cultural Norms and Expectations:** It's challenging to find time to master new digital skills when you have to balance job and family life.
- **Gender Bias:** Women instructors are typically not chosen for leadership roles in ICT projects.

To deal with the above-mentioned issues, we need digital capacity-building strategies that take gender into account, such as training that is relevant to women's lives, flexible scheduling, and safe, welcoming places to study.

6. Changes to institutions and policies

6.1 Changes Made by NEP-2020

- **National Mission for Mentoring (NMM-NCTE):** Gives experienced women teachers the chance to help younger women teachers.
- **National Digital Education Architecture (NDEAR):** Provides linked platforms for personalized learning and teacher training.
- **The National Professional Standards for Teachers (NPST)** promotes standards of competence that take gender into consideration.

6.2 Institutional management

- **Set up Gender and ICT Cells** at institutions to help women become leaders in technology enhanced learning.
- Set up in-service Women ICT Fellowships to promote new ideas in digital teaching.
- Add gender equality courses to all programs that educate women teachers.

7. Impact we Have seen

Case 1: Digital Literacy through DIKSHA in India

Hundreds and Thousands of women teachers took part in DIKSHA's digital literacy program, which made more women teachers interested in making e-content. A lot of women teachers became mentors of ICT integration at the district level.

Case 2: NISHTHA for Women Teachers

In Chhattisgarh, NISHTHA training modules in Hindi and local language enabled women teachers to create learning materials that were relevant to tribal kids, breaking down language barriers as well.

Case 3: Women Ed-Tech Leaders in Kerala

During COVID-19, women teachers in Kerala's Samagra Shiksha program, they developed digital curriculum for grades 1–12, and they were called “**Tech Gurus.**”

Case 4: Virtual Professional Communities

The “**Teachers of India**” online community is a place where women teachers from all across India work together to share bilingual lesson plans and reflective articles. This shows how peer-led empowerment can work.

8. Future Prospects

8.1 Artificial Intelligence and Personalization of Teaching

AI-powered learning systems in the schools may customize teacher training by offering courses and feedback based on performance data. This lets women acquire new skills in a flexible way.

8.2 Virtual Reality and Simulated Learning

Women teachers may use simulations to run their classrooms and teach the students, which makes it easier for them to get practice-based training.

8.3 Building Sisterhood Network

Digital platforms can provide facilities to link Indian women teachers with teachers from other countries, which encourages learning across cultures and working together on projects.

8.4 Localized and Multilingual OER Resources

Women teacher getting to create digital materials in more than one language makes education more culturally relevant and representative with OER.

8.5 Policy for Work-Life Integration

Women teacher may have more sustainable teaching careers if they have access to flexible online professional development platforms, childcare help, and hybrid work arrangements etc..

9. Conclusion

To get the inclusive and fair education that NEP-2020 envisions, it is important to give women teachers more influence via the technological-pedagogical knowledge system, and when they use and familiar with TPACK-based capacity building programme, women should enhance them from being passive consumers of technology to becoming active creators, leaders, and inventors of digital learning environments in the teaching learning process in the schools. Women teachers gain confidence, agency, and voices all the three important parts of empowerment with combining technology with teaching and learning in the classroom. Empowering women teachers, we get in turn, women teachers lead to better learning results, more gender equality, and helps strengthen the country as well.

To build these solid foundations with women teacher, we need to make changes to our policies, support from institutions, provide training to women teachers, that is relevant to the situation, and alter the culture. When women teachers are given the tools and knowledge, they need to use technology and teach well, they not only close the gender gap but also help India change its education system for the better in the digital age.

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