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Integration of TPACK Framework and Digital Competence in Enhancing Teaching Readiness among Pre-Service Teachers in Raipur District

Mrs Shweta Ojha

Assistant Professor, Aadarsh College

Datrenga Raipur, Chhattisgarh

Introduction

The rapid expansion of digital technologies has transformed pedagogical practices across global education systems. Contemporary classrooms increasingly require teachers to demonstrate not only disciplinary expertise but also the ability to meaningfully integrate technology into instruction. In this context, the Technological Pedagogical and Content Knowledge (TPACK) framework and digital competence have emerged as essential determinants of teacher effectiveness, especially for pre-service teachers preparing for their professional careers. This study examines how the integration of TPACK and digital competence contributes to teaching readiness among pre-service teachers in the Raipur district of Chhattisgarh, India.

Theoretical Background

TPACK Framework

Proposed by Mishra and Koehler (2006), the TPACK framework posits that effective technology integration occurs at the intersection of three knowledge domains:

- **Content Knowledge (CK)**
- **Pedagogical Knowledge (PK)**
- **Technological Knowledge (TK)**

The framework advocates that teachers must possess an integrated understanding of how subject matter, pedagogy, and technology function synergistically to enhance the teaching–learning process.

Digital Competence

Digital competence refers to the ability to use digital tools effectively, creatively, ethically, and safely. It encompasses information literacy, digital communication, content creation, problem-solving, and digital safety (Redecker, 2017). For pre-service teachers, digital competence is foundational for designing technology-enhanced learning environments.

Teaching Readiness

Teaching readiness is conceptualized as the extent to which pre-service teachers feel competent, confident, and prepared to engage in instructional planning, delivery, and classroom interaction. It includes pedagogical preparedness, technology-enhanced instructional skills, and professional disposition.

Significance of the Study

The study holds contemporary relevance for the following reasons:

- It provides empirical insights into the technological preparedness of pre-service teachers in the Raipur district.
- It highlights the need to strengthen ICT-embedded teacher education curricula.
- It provides evidence for policymakers and teacher-educators to redesign training programs incorporating TPACK and digital competence.
- It contributes to the limited body of research focusing on the Indian regional context, particularly in teacher training institutions.

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Statement of the Problem

Despite the increasing emphasis on technology-supported pedagogy, evidence suggests that many pre-service teachers in Raipur district possess limited exposure to the integrated application of TPACK and digital competence. This inadequacy often results in insufficient teaching readiness and a lack of confidence in implementing technology-mediated instruction. The present study investigates how TPACK and digital competence influence teaching readiness.

Operational Definitions

- **TPACK:** The composite score reflecting a pre-service teacher's integrated knowledge of technology, pedagogy, and content.
- **Digital Competence:** The level of proficiency in using digital tools ethically, creatively, and effectively for educational purposes.
- **Teaching Readiness:** The self-perceived preparedness for instructional planning, classroom management, technology integration, and teaching performance.
- **Pre-Service Teachers:** Students enrolled in D.El.Ed. or B.Ed. programs preparing for the teaching profession.

Variables

- Independent Variables- TPACK competency, Digital competence level
- Dependent Variable- Teaching readiness

Objectives of the Study

1. To assess the TPACK levels of pre-service teachers in Raipur district.
2. To evaluate their digital competence.
3. To determine the influence of TPACK and digital competence on teaching readiness.
4. To examine group differences (gender, program type, institution type) in TPACK and digital competence.

Research Questions

1. What are the prevailing TPACK competency levels among pre-service teachers?
2. To what extent does digital competence affect teaching readiness?
3. Is there a statistically significant relationship between TPACK and teaching readiness?
4. Do demographic variables significantly differentiate levels of TPACK and digital competence?

Scope of the Study

The study focuses exclusively on pre-service teachers enrolled in selected B.Ed. and D.El.Ed. institutions in Raipur district and examines only TPACK, digital competence, and teaching readiness.

Delimitations

- Restricted to a limited number of teacher training institutions.
- Relies on self-reported questionnaire data, which may introduce response bias.
- The assessment of TPACK and digital competence is based on standardized measurement scales.

Review of Related Literature

- Mishra & Koehler (2006)- Established TPACK as a robust theoretical model for understanding technology integration and emphasized its role in enhancing instructional quality.
- Chai, Koh & Tsai (2013)- Found that structured TPACK training significantly improves pre-service teachers' ability to apply digital tools within pedagogical contexts.
- Redecker (2017)- Described digital competence as an indispensable 21st-century teaching requirement, highlighting its relevance for sustainable educational innovation.

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- Janssen et al. (2019)- Discovered a positive correlation between digital competence and teaching effectiveness among beginning teachers.
- Singh & Kaur (2022)- Reported disparities in ICT utilization among Indian pre-service teachers, suggesting gaps in digital infrastructure and training.

Research Gap

Although global research has explored TPACK and digital competence independently, limited empirical studies have examined their combined influence on teaching readiness within the Indian context. Research focusing specifically on pre-service teachers in Raipur district remains scarce, indicating a need for localized inquiry.

Research Methodology

- Research Design- Descriptive and correlational survey-based design.
- Population- All pre-service teachers enrolled in B.Ed. and D.El.Ed. colleges in Raipur district.
- Sample- A sample of 200 pre-service teachers selected through convenient or simple random sampling.
- Sampling Technique- Convenience sampling or simple random sampling.
- Sources of Data- Primary data collected through structured questionnaires.

Research Instruments

- TPACK Competency Scale (adapted version)
- Digital Competence Assessment Scale
- Teaching Readiness Inventory

Data Collection Procedure

Data is collected through institutional permissions, direct administration of questionnaires, and online forms (e.g., Google Forms) where applicable.

Statistical Techniques

- Descriptive statistics: Mean, Standard Deviation
- Inferential statistics: t-test, ANOVA
- Correlation analysis
- Multiple regression to examine predictive influence of TPACK and digital competence on teaching readiness

Major Findings

- Higher TPACK scores are likely to significantly predict better teaching readiness.
- Digital competence may emerge as a strong determinant of instructional preparedness and confidence.
- Differences may be observed based on gender, program type, and prior technological exposure.

Summary, Conclusions, and Recommendations

The study concludes that the integration of TPACK and digital competence is crucial for fostering teaching readiness among pre-service teachers. To enhance teacher preparation programs, the following recommendations are proposed:

- Incorporation of TPACK-based modules in teacher education curricula.
- Establishment of digital learning labs for hands-on ICT practice.
- Mandatory training on digital ethics, safety, and content creation.
- Use of micro-teaching sessions embedded with technology-enhanced pedagogies.
- Continuous professional development opportunities for teacher educators.

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