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EXAMINING THE IMPACT OF TECHNO-PEDAGOGICAL COMPETENCY ON TEACHER EFFECTIVENESS AMONG SECONDARY SCHOOL EDUCATORS

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Abstract

Teachers must be able to successfully incorporate technology into their pedagogy given the rapidly changing landscape of digital education. This study looks at how secondary school teachers' effectiveness is affected by their techno-pedagogical proficiency. The study uses a quantitative, co relational research approach to examine how instructors' technological and pedagogical integration abilities affect their instructional effectiveness. It is based on the Technological Pedagogical Content Knowledge (TPACK) paradigm. Standardized measures of teacher effectiveness and techno-pedagogical proficiency were used to gather data from 250 secondary school teachers. Techno-pedagogical competency and teacher effectiveness were found to be significantly positively correlated by statistical analysis ($r = .68$, $p < .01$). Additionally, the results of the regression showed that 46% of the variation in teacher effectiveness was explained by techno-pedagogical competency. The results confirm that teachers who use digital technologies in conjunction with good pedagogy had higher levels of student engagement, professional confidence, and instructional quality. The study emphasizes the necessity of methodical professional development programs targeted at improving teachers' abilities to integrate digital pedagogy, especially in secondary education settings.

Keywords **-** Techno-pedagogical competency, teacher effectiveness, TPACK, secondary education, digital pedagogy, professional development

1. INTRODUCTION

The classroom of the twenty-first century is marked by innovation, technical advancement, and the need for teachers who are proficient in digital technology. Teachers are expected to use technology with pedagogy and subject expertise to create productive learning environments as educational systems around the world incorporate digital platforms and technologies. This demand has increased due to the rise of blended and online learning models, which highlight the need of techno-pedagogical proficiency (Mishra & Koehler, 2006).

The effectiveness of teachers continues to be a crucial component in evaluating educational quality. In addition to having solid pedagogical and subject-matter expertise, effective instructors are able to employ technology in novel ways to improve instruction. This ability becomes crucial in secondary education, when pupils are becoming more and more digital natives. Nevertheless, a lot of teachers find it difficult to strike a balance between the use of technology and good teaching methods (Voogt et al., 2013).

This study addresses the need for evidence-based techniques that enhance technology-driven teaching practices worldwide by examining how techno-pedagogical competency affects teacher effectiveness among secondary school educators.

2. **Literature Review**

2.1 Concept of Techno-Pedagogical Competency

The ability of educators to plan, carry out, and assess lessons that successfully combine technology, pedagogy, and content is known as techno-pedagogical competency, or TPC. The approach is based on Mishra and Koehler's (2006) technical Pedagogical Content Knowledge (TPACK) paradigm, which incorporates technical knowledge into Shulman's (1986) concept of pedagogical content knowledge.

Teachers with high TPC are able to match technology use with curriculum objectives, modify pedagogy to meet student requirements, and use appropriate digital technologies (Koehler & Mishra, 2009). Developing techno-pedagogical competency is essential for successful instruction in contemporary classrooms, according to studies by Chai et al. (2013) and Tondeur et al. (2017).

2.2 Teacher Effectiveness in Secondary Education

The degree to which educators use professional engagement, classroom management, and instructional preparation to support intended student learning outcomes is referred to as teacher effectiveness (Darling-Hammond, 2017). Teacher success in secondary school is linked to the development of students' motivation, digital literacy, and critical thinking skills. According to research, when supported by effective educational design, technology integration can greatly improve these features (Harris et al., 2009).

2.3 Relationship Between TPC and Teacher Effectiveness

Techno-pedagogical competency and teaching efficacy are positively correlated, according to empirical research. Instructors that make use of online learning platforms, interactive tools, and multimedia content show increased student engagement and instructional effectiveness (Koh & Divaharan, 2011). There is a knowledge vacuum about the link in secondary school, where learner profiles and curricular structures are different, because the majority of research has been done in higher education environments.
By examining the degree to which techno-pedagogical skill predicts teacher effectiveness among secondary educators, this study aims to close that gap.

3. **Objectives of the Study**

1. To assess the level of techno-pedagogical competency among secondary school teachers.

2. To determine the level of teacher effectiveness in secondary schools.

3. To examine the relationship between techno-pedagogical competency and teacher effectiveness.

4. To explore whether techno-pedagogical competency predicts teacher effectiveness among secondary educators.

4. **Theoretical Framework**

The TPACK framework (Mishra & Koehler, 2006), which highlights the interaction between three fundamental categories of teacher knowledge, serves as the study's compass.
Technological Knowledge (TK): Knowing how to utilize digital platforms and technologies. Pedagogical Knowledge (PK): Proficiency with instructional techniques and tactics

Content Knowledge (CK): Subject-matter expertise

Effective teaching, according to TPACK, arises when teachers harmoniously combine various areas and modify technology to meet pedagogical objectives and content requirements. Teacher efficacy is seen in this study as a result of this integration process.

5. **Methodology**

5.1 Research Design

The association between teacher effectiveness and techno-pedagogical competency was investigated using a quantitative, correlational research methodology.

5.2 Participants

250 secondary school teachers from both public and private institutions made up the sample (130 female and 120 male). To guarantee diversity across topic areas and school types, participants were chosen by stratified random sampling.

5.3 Instruments

Techno-Pedagogical Competency Scale (TPCS): This 30-item test evaluates teachers' technological, pedagogical, and integrative abilities. It is based on the TPACK paradigm.
Teacher Effectiveness Scale (TES): The 25-item Teacher Effectiveness Scale (TES) assesses professional development, communication, classroom management, and instructional planning.
Experts in educational technology validated both tools, producing dependability coefficients of 0.86 (TES) and 0.89 (TPCS).

5.4 Data Analysis

Multiple regression analysis was used to assess the predictive potential of techno-pedagogical ability on teacher effectiveness, while Pearson's correlation was used to look at associations. SPSS version 27 was used for the analyses.

6. **Results**

Teachers demonstrated moderate-to-high levels of teacher effectiveness ($M = 3.95$, $SD = 0.59$) and techno-pedagogical competency ($M = 3.82$, $SD = 0.62$), according to descriptive statistics.
Techno-pedagogical proficiency and teacher effectiveness were shown to be significantly positively correlated ($r = .68$, $p < .01$). Techno-pedagogical competency accounted for 46% of the variance ($R2 = 0.46$) and was found to be a significant predictor of teacher effectiveness ($\beta = .62$, $t = 11.45$, $p < .001$).

7. **Discussion**

The findings support the idea that improving teacher effectiveness is mostly dependent on techno-pedagogical expertise. Teachers that were adept at integrating technology and pedagogy showed increased adaptability and efficiency in the classroom. These results are consistent with other studies by Voogt et al. (2013) and Chai et al. (2013), which highlighted how successful technology integration enhances both student outcomes and teacher quality.
Additionally, the study shows that innovative use of digital technologies by secondary instructors promotes dynamic, student-centered learning settings. However, uneven access to technology and a lack of training opportunities continue to impede optimal utilization. This emphasizes the necessity of continuing professional development courses that cover instructional design, technology-supported assessment, and digital literacy.

8. **Implications**

For Educational Practice

In order to provide instructors with useful techniques for integrating technology, school administrators should place a high priority on ongoing training in digital pedagogy.

For Policy Makers

Techno-pedagogical proficiency should be a fundamental part of teacher professional requirements in teacher education and certification programs.
For Future Research

Further research on how techno-pedagogical skill changes over time and affects student accomplishment could be conducted through longitudinal and mixed-method studies.

9. **Conclusion**

According to the study's findings, teacher effectiveness in secondary school is significantly predicted by techno-pedagogical proficiency. Teachers need to be able to effectively incorporate technology into their pedagogy as classrooms grow more digital. Achieving successful, future-ready educational systems requires bolstering techno-pedagogical ability through methodical professional development and institutional assistance.

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