



Exploring Teachers' TPACK: Insights into Gender Dynamics and Institutional Variations

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Abstract

This study investigates the Technological Pedagogical Content Knowledge (TPACK) among secondary school teachers, focusing on differences based on gender and institutional type. Employing a descriptive survey design, data was gathered from 145 secondary school teachers in Ahmedabad District through purposive sampling. A Likert scale, adapted from established tools, served as the primary instrument for data collection. Statistical analysis, including t-tests, revealed no significant differences in TPACK mean scores between male and female teachers or between government and private school teachers. The findings underscore the need for targeted training, policy reforms, and motivational strategies to enhance teachers' technological integration in pedagogy.

Keywords: Technological Pedagogical Content Knowledge, Gender Differences, Institutional Types

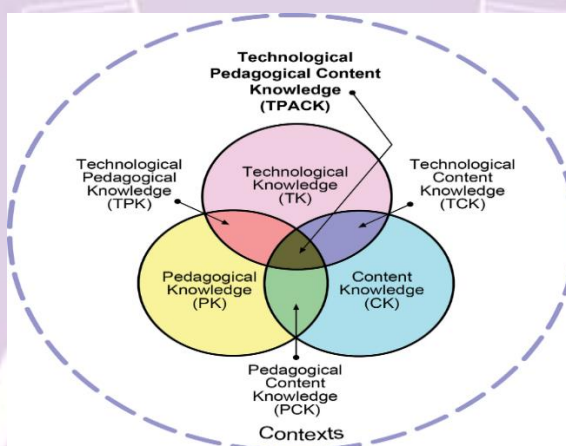
1. Introduction

Transformational shifts in education, particularly within the social sciences, demand comprehensive strategies and significant time. The rapid advancement of technology has placed increased pressure on educators to effectively integrate technical tools and systems into their teaching practices. Recent studies highlight that governments and policymakers are investing significantly in academic technologies such as computers, mobile devices, and interactive whiteboards. However, a major challenge persists: both new and experienced teachers often lack the necessary training to seamlessly integrate these technologies into their classrooms. Despite belonging to the "digital generation," many teachers struggle with the effective incorporation of ICT (Information and Communication Technology) into teaching and learning processes. Training programs for educators frequently focus on the technology itself, rather than its application within the broader context of teaching strategies and subject matter. Research underscores that effective use of technology in education requires teachers to possess an integrated understanding of three key domains: technical knowledge, content knowledge, and pedagogical knowledge, collectively referred to as Technological Pedagogical

Content Knowledge (TPACK). For technology to realize its full potential in schools, teachers must not only understand these individual domains but also be capable of integrating them to design and implement effective lessons. It is often assumed that younger, tech-savvy teachers are better equipped to bridge the technological divide in education. However, research challenges this assumption, revealing that while newer teachers may be comfortable using technology for personal or administrative tasks, they often lack the pedagogical and content knowledge required for meaningful technology integration in teaching.

2. TPACK Framework

The Technological Pedagogical Content Knowledge (TPACK) framework, developed by Mishra and Koehler (2006), offers a conceptual model for understanding the comprehensive knowledge base that teachers need to effectively integrate technology into their teaching practices. Since its inception, the TPACK framework has significantly influenced teacher development, training methodologies, and research in educational technology.



Koehler and Mishra (2005a, 2005b) introduced a "learning-by-design" approach to foster TPACK, suggesting that one of the most effective ways for teachers to learn about educational technology is through active design and problem-solving. This method encourages teachers to work collaboratively in design teams comprising individuals with diverse expertise in content, pedagogy, and technology. Together, these teams create innovative solutions to real-world pedagogical challenges using technology (Peruski, Mishra, & Koehler, 2007).

In this iterative process, educators operate at the intersection of content knowledge (what to teach), pedagogical knowledge (how to teach), and technological knowledge (what tools to use). As Koehler



et al. (2011) emphasize, the continuous integration of these domains enables teachers to develop strategies that align technology with both subject-specific content and effective teaching methods

3. Objectives of the Study

The study was guided by the following objectives:

1. To examine the differences in teachers' Technological Pedagogical Content Knowledge (TPACK) with respect to their gender.
2. To explore the differences in teachers' TPACK concerning the type of institution they work in.

4. Hypotheses of the Study

1. There is no significant difference in the TPACK mean scores of male and female teachers.
2. There is no significant difference in the TPACK mean scores of teachers working in government and private schools.

5. Delimitations of the study:

1. The proposed study will be delimited to only the schoolteachers of Ahmedabad Gujarat, India.
2. The proposed study will be delimited to only the teachers teaching in Government and private school of Ahmedabad.

6. Methodology of the Study

6.1 Design of the Study

The study employed a descriptive research design to address the research objectives.

6.2 Population of the Study

The population comprised secondary school teachers from Ahmedabad District, including those teaching in both government and private schools affiliated with the Board of Secondary Education, Ahmedabad.

6.3 Sample of the Study

A purposive sampling technique was used to select participants. Teachers available at the time of the study and willing to provide responses formed the sample. A total of 145 teachers (N=145) participated in the study. The sample size was determined using Rao software.

6.4 Tools Used for the Study

The researcher adapted a Likert scale for data collection, drawing from two established tools:



- **Tool 1:** Developed by Dr Sunita.
- **Tool 2:** Developed by Dr Sunita

6.5 Techniques of Data Analysis:

Data collected through the Likert scale were analyzed using descriptive and inferential statistical methods. Specifically, a t-test was applied to assess differences in TPACK scores among the groups

7. Analysis and Interpretations:

The analysis and interpretations are based on the formulated hypotheses and the data collected.

H₀₁: There is no significant difference in the TPACK mean scores of male and female teachers.

Table 1

Gender	Number of Teachers (N)	Mean	SD	Calculated t-value	Table t-value	t-df	Level of Significance
Female	55	123.59	22.01	0.41	1.98	106	0.05
Male	53	121.76	23.61				

Graph 1. :

The graph comparing the mean scores of female and male teachers shows that the mean score for female teachers (123.59) is slightly higher than that for male teachers (121.76). However, the calculated t-value (0.41) is less than the table t-value (1.98) at the 0.05 level of significance.

Interpretation:

This indicates that there is no statistically significant difference between the TPACK mean scores of female and male teachers. Therefore, **Hypothesis 1 is accepted.**

H₀₂: There is no significant difference in the TPACK mean scores of teachers working in government and private schools.



Table 2

Type of Institutions	Number of Teachers (N)	Mean	SD	Calculated t-value	Table t-value	df	Level of Significance
Government School Teachers	83	121.95	22.30	0.70	1.98	106	0.05
Private School Teachers	25	118.00	25.11				

Graph 2:

The graph comparing the mean scores of government and private school teachers indicates that the mean score of government school teachers (121.95) is slightly higher than that of private school teachers (118.00). The calculated t-value (0.70) is less than the table t-value (1.98) at the 0.05 level of significance.

Interpretation:

This finding suggests that there is no significant difference in the TPACK mean scores between government and private school teachers. Therefore, **Hypothesis 2 is accepted.**

8. Final Remarks

The recommendations drawn from this study are informed by research findings and other relevant data. Based on the results, the investigator suggests the following measures to enhance teachers' Technological Pedagogical Content Knowledge (TPACK):

8.1 Focused Training for Teachers:

Structured training programs should be designed and conducted to improve teachers' technological and pedagogical competencies. These programs should aim to bridge the gap between technology use and pedagogical practices.

8.2 Regular In-Service Training:

Schools should organize frequent in-service training sessions to update teachers on the latest advancements in teaching methods and technologies. This will help educators refine their teaching skills and stay relevant in a dynamic educational landscape.



8.3 Policy Reforms for Teacher Support:

Governments should revise existing policies to ensure teachers receive adequate support in terms of resources and infrastructure. Administrations must regularly assess the needs of teachers and provide a conducive environment for teaching and learning.

8.4 Inspiring Role Models:

Schools should arrange extension lectures by exemplary professionals in the field of education. Such sessions can provide real-world examples of dedication and commitment, inspiring teachers to strive for excellence in their roles.

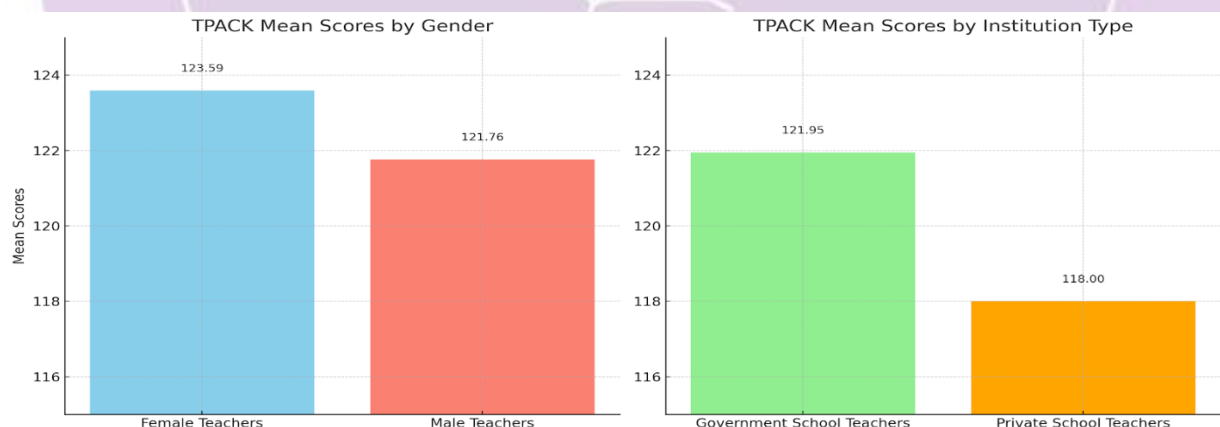
8.5 Personal Growth Opportunities:

Teachers should be encouraged to identify and explore their strengths and weaknesses. Schools should actively support teachers in overcoming their challenges and building on their capabilities.

8.6 Motivational Recognition:

Authorities should pay due attention to teachers' contributions and provide both intrinsic and extrinsic motivation. Acknowledging their efforts can enhance job satisfaction and inspire a stronger commitment to their professional responsibilities.

Graph 1 and 2



9. Conclusion

The study concludes that there is no significant difference in TPACK levels among secondary school teachers based on gender or institutional type. These findings highlight the need for focused training, continuous professional development, and supportive policies to enhance teachers' integration of



technology into pedagogy. By addressing these areas, educators can be better equipped to meet the demands of modern teaching.

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