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A Study on TPACK Competency among B.Ed. Students in Erode District

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Abstract: *The present study explores the Technological Pedagogical Content Knowledge (TPACK) competency among B.Ed. trainees in Erode District. TPACK competency is essential for teachers in effectively integrating technology into their teaching practices. The study aims to find the overall level of TPACK competency among the trainees and to determine if there are significant differences in TPACK competency based on gender, age, academic year and specialization. Data were collected from sample of B.Ed. trainees studying in Teacher Education Institutions at Erode District. The Questionnaire (TPACK competency scale) designed by the investigator which used to measure the competency of the B.Ed., trainees. The investigator employed descriptive statistics (Mean and SD) and parametric statistics ('t' test) to analyze the data. The findings indicate that the overall level of TPACK competency among the trainees is high. Further analysis reveals significant differences in TPACK competency with respect to age, academic year, and specialization. However, no significant difference is observed between male and female trainees in their TPACK competency. The implications of these findings suggest the need for targeted professional development programs that address the specific needs of different demographic groups. The study recommends regular assessment and feedback mechanisms, specialized workshops, and mentorship programs to enhance TPACK competency among B.Ed. trainees. The absence of gender disparity in TPACK competency underscores the effectiveness of current training programs in promoting gender inclusivity.*

Keywords: B.Ed Students, Erode District, Teacher Education, TPACK, Training Programs

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1. Introduction

The integration of technology into teaching and learning processes has become very important in today's advancement of education. The Technological Pedagogical Content Knowledge (TPACK) is a framework that highlights the interplay among three important forms of knowledge: content knowledge (CK), pedagogy knowledge (PK), and technology knowledge (TK). For B.Ed. students, it's necessary to develop competency in TPACK to equip budding teachers with adequate skills to integrate technology into their teaching. This study focuses the TPACK competency among B.ED., trainees in Erode district. This study aims to find their readiness to utilize technology in teaching practice and identify areas for improvement.

2. Materials and Methods

2.1. Literature Review

ICT and TPACK competencies of students differ according to grade, having one's own computer for educational purposes, and one's perceived ability to use technology, but do not differ by gender (Burak Demirtaş and Filiz Mumcu, 2021). The seminar is suitable for increasing the participants' TPACK since we were able to improve the students' skills to implement educational technology into their lesson plan (Zimmermann, F. et al., 2021). Pre-service teachers showed a low degree of confidence regarding their capabilities of integrating technological with pedagogical and content knowledge, especially in three of the components, this obstacle was overcome after the intervention. It is possible to conclude that the pedagogical and conceptual orientation of the teaching proposal has shown a positive effect, evidencing the effectiveness of a comprehensive approach capable of adapting to the specificity and challenges of social studies education (Miguel-Revilla, et al., 2020). Technology competencies have a positive relation to TPACK; likewise, the teachers' attitudes in technology integration were able to strengthen the positive relation between technology competency and science teacher's TPACK. Therefore, teacher's attitude is an important factor should be concerned in improving teacher's TPACK (Yulisman, H. et al.2019). The teaching experience plays a very important role in TPACK. Optimal learning can be obtained if a teacher has good of knowledge, and the

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ability to lead students to master the subject matter and integrate it into a technology (K Agustini et al., 2019). ICT usage and technology use knowledge and skills also influence overall TPACK competencies (I. Kabakci Yurdakul and A. N. Coklar, 2014).

2.2. Significance of the Study

The integration of technology in education enhances learning experiences, facilitates personalized learning, and prepares students for a digitalized world. As B.Ed., students are the prospective educators, their competency in TPACK is essential for enhancing student engagement and learning outcomes, to identify gaps in current teacher education programs and improve the curriculum and to foster an environment where future teachers can design and implement student-centered learning experiences using technology.

2.3. Objectives of the Study

The primary objectives of this study are:

- To find the TPACK competency among B.Ed., students in Erode district.
- To find the differences between demographic factors (such as age, gender, academic year and specialization) and TPACK competency.

2.4. Hypotheses of the Study

- The level of TPACK competency among B.Ed., students in Erode district is high.
- There is no significant difference in TPACK competency among B.Ed., students based on their age.
- There is no significant difference in TPACK competency among B.Ed., students based on their gender.
- There is no significant difference in TPACK competency among B.Ed., students based on their academic year.
- There is no significant difference in TPACK competency among B.Ed., students based on their specialization.

2.5. Methodology of the Study

Method: The investigator has used survey method to study TPACK competency among B.Ed., students in Erode district.

Population and Sample: The population for the study includes the B.Ed. trainees those who are studying in the Teacher Education Institutions in Erode District. In this study, the investigator has selected 150 B.Ed. trainees by using a simple random sampling technique.

Tool Used: The TPACK Competency Scale, constructed and standardized by the investigator, is a Likert-type scale with 25 items, each offering five response options: Never, Rarely, Sometimes, Often, and Always.

Statistical Techniques Used: The investigator employed descriptive statistics (Mean and SD) and parametric statistics (‘t’test).

Hypothesis: The level of TPACK competency among B.Ed., students in Erode district is high.

Variable	N	M	SD	Level
TPACK Competency	150	109.26	10.37	High

Table 1: Level of TPACK competency among B.Ed., students in Erode district

Table 1 reveals that, the calculated mean value of competency among B.Ed., trainees 109.26 falls in the High Level (H = 83.2 to 125). Hypothesis 1 is accepted. Hence, it concluded that the level of TPACK competency among B.Ed., students in Erode district is high.

Hypotheses: There is no significant difference in TPACK competency among B.Ed., students based on their age, gender, academic year and specialization

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Group of Students	Sub Group	N	Mean	Standard Deviation	't' value	Significance
Gender	Male	63	108.36	11.02	0.79	Not Significant
	Female	87	109.74	9.92		
Age	Below 25	80	107.36	10.59	2.32	Significant
	25 & Above	70	111.22	9.81		
Academic Year	I Year	91	111.29	7.31	1.96	Significant
	II Year	59	113.47	6.19		
Specialization	Arts	59	101.67	10.24	8.08	Significant
	Science	91	114.02	7.097		

Table 2: 't'-value of the variables gender, age, academic year, and specialization of B.Ed. trainees

The analyzed data collected from the subsamples revealed that significant difference exists in the level of TPACK competency with respect to age, academic year and specialization. Hence the null hypothesis stated on age, academic year and specialization are rejected and concluded that there is a significant mean difference in age, academic year and specialization. On the hand, there is no significant difference in the level of TPACK competency with respect to gender. Hence the null hypothesis stated on gender is accepted and concluded that there is no significant mean difference with respect to gender.

3. Results

- The level of TPACK competency among B.Ed., trainees is high.
- There is significant difference in TPACK competency of B.Ed., trainees with respect to their age, academic year and specialization.
- There is no significant difference between the male and female B.Ed., trainees in their TPACK competency.

4. Discussion

The study confirms a high level of Technological Pedagogical Content Knowledge (TPACK) competency among B.Ed. trainees in the Erode district, with a mean score of 109.26. Significant disparities exist across age, academic year, and specialization, while gender shows no significant difference in competency levels. For a detailed breakdown of these findings.

The overall level of Technological Pedagogical Content Knowledge (TPACK) competency among B.Ed. students in Erode district is high (\(M = 109.26\), \(SD = 10.37\)). This indicates that teacher education programs successfully integrate digital tools, teaching methods, and subject matter into the curriculum. This finding aligns with contemporary research highlighting strong digital literacy among pre-service teachers due to modernized teacher training frameworks.

Gender and TPACK Competency: The study found no significant difference in TPACK competency based on gender (\(t = 0.79\), \(p > 0.05\)). Both male (\(M = 108.36\)) and female (\(M = 109.74\)) trainees exhibit statistical equivalence in their technological integration capabilities. This outcome confirms that institutional access to technology and instructional design training is equitable. It supports previous research demonstrating that gender gaps in digital teaching competencies are closing in modern teacher education.

Age and TPACK Competency: A significant difference was observed based on age (\(t = 2.32\), \(p < 0.05\)). Trainees aged 25 and above achieved a higher mean score (\(M = 111.22\)) than those below 25 (\(M = 107.36\)). This suggests that mature students possess deeper content knowledge and pedagogical maturity. They integrate technology more purposefully than younger peers, who may use technology frequently but less instructionally.

Academic Year and TPACK Competency: The academic year significantly impacts TPACK levels (\(t = 1.96\), \(p \le 0.05\)). Second-year B.Ed. students achieved a higher mean score (\(M = 113.47\)) than first-year students (\(M = 111.29\)). This improvement stems from advanced coursework, micro-teaching sessions, and extended teaching practice during the second year. Progressive curricular exposure systematically refines practical technology integration skills.

Specialization and TPACK Competency: A highly significant difference emerged between specializations (\(t = 8.08\), \(p < 0.05\)). Science trainees scored substantially higher (\(M = 114.02\)) than Arts trainees

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(\(M = 101.67\)). This disparity points to the heavy reliance on digital simulations, virtual labs, and data visualization tools in science education. Arts pedagogy relies more heavily on traditional lecture and text-based instructional methods.

Educational Implications: The high TPACK competency necessitates the enhancement of the current curriculum, incorporating advanced technology-related pedagogical practices. Professional development programs should be tailored to age, academic year, and specialization, while promoting gender inclusivity, ensuring technology and pedagogy are accessible and achievable for all genders.

Suggestions and Recommendations

- Regular assessments are being conducted to assess TPACK competency among B.Ed. trainees, allowing feedback to be used to adjust teaching strategies and training programs.
- Implement mentorship programs with experienced trainees/instructors to mentor younger trainees, thereby bridging any competency gaps.
- Conduct workshops tailored to different age groups, academic years, and specializations, offering hands-on experience with relevant technology tools for their specific teaching contexts.
- Encourage collaborative learning projects that enable trainees to collaborate, share knowledge, and enhance their TPACK skills in a real-world setting.
- Ensure that resources such as technology tools, software, and training materials are readily available and accessible to all trainees, regardless of their demographic characteristics.

5. Conclusion

The study on TPACK competency among B.Ed. trainees in Erode District reveals that high level of competency. However, significant differences based on age, academic year, and specialization, suggest that Specific measures are necessary to ensure equal competency development across all groups. The absence of major disparities based on gender is a positive sign of equality in training programmes. Continuous evaluation and specific professional development are essential for upholding and enhancing TPACK competency. Educators may ensure that all B.Ed. students are well-prepared to properly incorporate technology into their teaching practices. Also, focusing on the individual requirements of diverse trainee populations and promoting an inclusive learning environment.

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