TECHNOLOGICAL PEDAGOGICAL AND CONTENT KNOWLEDGE (TPACK) AMONG PROSPECTIVE TEACHERS

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DOI: https://doi.org/10.34293/eduspectra.v5is1-may23.013

Abstract

Prospective teachers have an important role in the educational system, they are going to handle the future generations, therefore,their quality is an essential factor to be monitored so that the future pillars of the nation will be properly facilitated and guided to become an efficient contributor for the development of a nation. Future teachers should possess the knowledge of technology along with pedagogical and content knowledgeto manage the digital native students. This study aims to analyse the Technological Pedagogical and Content Knowledge among the Prospective teachers in Dindigul District. Samples of 100 Prospective teachers were selected randomly for this study. TPACK survey questionnaire developed by Özkan Akman & Cemal Güven (2015) has been used to collect the data.

Keywords: *Prospective Teachers, TPACK, Digital Natives, ICT, Pre-Service Teachers*

Introduction

Teachers in the twenty-first century live in a period of rapid technological development in all aspects of life.The teaching profession has also become one of the professions that need to keep up with this change. From this point it is very necessary to trainqualified teachers to achieve the goals set in the education system and to reach international standards (Tafli, 2021) A teacher must be skilled in the use of technology in the classroom in addition to knowing the learning material that must be mastered. Teachers with technological knowledge in addition to PCK are needed in the information and communication age, and they must be able to integrate this into the teaching process (Tafli, 2021).Technology in education makes teaching activities easier for both teachers and students(BAŞARAN, 2020). Technological Pedagogical Content Knowledge (TPACK) is a framework that describes the complex and dynamic nature of teaching with technology and has become an important concept in the field of educational technology.The Technological Pedagogical Content Knowledge (TPACK) framework is widely used for comprehending, learning, and describing various types of knowledge required by professors or teachers (Mishra & Koehler, 2006).The Technological Pedagogical Content Knowledge (TPACK) framework provides a theoretical perspective of showing whether a teacher can effectively design and conduct technology-enhanced instruction (Dikmen & Demirer, 2022).

TPACK emphasizes the importance of understanding how technology can be used to enhance the teaching and learning of specific subject matter, and how effective

teaching with technology requires a unique combination of content knowledge, pedagogical knowledge, and technological knowledge.Therefore, the prospective teachers who were going to deal with the future generations should possess the skill of integrating technology along with pedagogical and content knowledge for engaging the digital natives properly and efficiently.

Need for the Study

It is the need of the hour that the education system blends with technology during the COVID-19 pandemic for providing continue and quality education to the students. Integrating technology into teaching is crucial for teachers to prepare students for a digitalized future in the face of digitalization. As a result, it is commonly argued that pre-service teachers should acquire subject-specific professional knowledge regarding technology integration to support the learning of their future students. (Lachner et al., 2021)

Most of the school provides ICT resources like computers, smart boards, etc but does the future teachers were ready to blend with it is a question mark.Teachers should know how to integrate recent technological developments into their classrooms(Adalar, 2021). Competencies and active participation should be there among the teachers to effectively and efficiently use the technology available in learning environments for the purpose. (Akturk & Ozturk, 2019).Currently, one of the most prominent models of teacher knowledge for the effective use of digital technologies in teaching is the TPACK model (Schmid et al., 2020).This study aims to assess the TPACK among Prospective teachers who were going to be future teachers. Hence the present study "Technological Pedagogical And Content Knowledge among Prospective Teachers".

Teachers should know how to integrate recent technological developments-comments into their classrooms.

Methodology

- **Sample:** A sample of 100 prospective teachers from the Dindigul district was selected using a simple random sampling technique
- **Tool:** TPACK survey questionnaire developed and standardized by Ozkan Akman & Cemal Guven (2015) has been used to collect the data

Objectives of the Study

The present study aims to measure the level of TPACK among prospective teachers. Based on the aim of the study following objectives are framed

- To measure the level of TPACK among the Prospective teachers.
- To find out the significant difference between the Prospective teachers in TPACK based on their selected Independent variables like gender and location of residence.

Hypothesis

- The Prospective teachers have above average level of TPACK.
- There is no significant difference in TPACK and its dimensions between the male and female Prospective teachers.
- There is no significant difference in TPACK and its dimensions between the Prospective teachers from rural and urban area.

Hypothesis 1

The Prospective teachers have above-average level of the different dimensions of TPACK

Table 1 Empirical Average Scores of TPACK and its Dimensions

TPACK Dimension	N	(EMPIRICAL) Average	Theoretical average
TK	100	25.84	24
PK	100	19.73	18
CK	100	18.48	12
TPK	100	13.05	12
TCK	100	17.39	16
PCK	100	18.54	14
TPACK	100	12.42	14

The above table shows that the Theoretical average of Technological Knowledge (TK) is 24 whereas theempirical value is 25.84, this shows that the prospective teachers have an average level of Technology Knowledge (TK) – **The hypothesisis accepted.**

The theoretical average of Pedagogy knowledge (PK) is 18, whereas the empirical value is 19.73 which shows that prospective teachers have a high level of PK. – **Hypothesis Accepted**

The theoretical average of Content Knowledge (CK) is 12, whereas the empirical value is 18.48, this shows that prospective teachers have above average level of CK. – **Hypothesis Accepted**

The theoretical value of Technological Pedagogical Knowledge (TPK) is 12 whereas the empirical value is 13.05, therefore the prospective teachers have above average level of TPK – **Hypothesis accepted**

The theoretical value of Technological Content Knowledge (TCK) is 16, whereas the empirical value is 17.39. this shows that the prospective teachers have above average level of TCK – **Hypothesis accepted**

The theoretical value of Pedagogical content Knowledge is 14, whereas the empirical value is 18.54. this shows that the prospective teachers have above-average level of PCK. – **Hypothesis Accepted**

The theoretical value of Technological Pedagogical Content Knowledge (TPACK) is 14, but the empirical value is 12.42. this shows that the prospective teachers have below-average level of TPACK – **Hypothesis Rejected.**

Hypothesis 2

There is no significant difference in TPACK and its dimensions between the male and female Prospective teachers.

Table 2 Statistical Measures and Results of a Test of Significance of the Difference Between the Mean scoRes of TPACK and Dimensions among Prospective Teachers: Gender–Wise

TPACK Dimension	Variable	Sub-Variable	N	Mean	SD	t-value	Significance at 0.05 level
TK	Gender	Male	33	24.2424	5.12366	2.11	Significant
		Female	67	26.6269	5.65105		
PK	Gender	Male	33	20.3030	3.64422	1.23	Not Significant
		Female	67	19.4478	2.31126		
CK	Gender	Male	33	18.2424	1.87133	0.90	Not Significant
		Female	67	18.5970	1.78427		
TPK	Gender	Male	33	12.8182	3.69505	0.44	Not Significant
		Female	67	13.1642	3.60386		
TCK	Gender	Male	33	18.6970	6.16687	1.57	Not Significant
		Female	67	16.7463	5.05528		
PCK	Gender	Male	33	18.7576	3.52695	0.45	Not Significant
		Female	67	18.4328	3.09067		
TPACK	Gender	Male	33	12.1212	1.89996	1.09	Not Significant
		Female	67	12.5672	1.95575		

The above table shows that the t-values 1.23, 0.90, 0.44, 1.57, 0.45, and 1.09 were less than the table value 1.96 at a 0.05 level of significance. Therefore there is no significant difference in PK, CK, TPK, TCK, PCK and TPACK among the prospective teachers – **Hypothesis Accepted**

The above table shows that the t-value of 2.11 is higher than the table value of 1.96 at a 0.05 level of significance. This shows that there is a significant difference in TK among the prospective teachers. Further, it shows that female prospective teachers have a high level of Technological knowledge than male prospective teachers – **Hypothesis Rejected**

Hypothesis 3

There is no significant difference in TPACK and its dimensions between the Prospective teachers from rural and urban area.

Table 3 Statistical Measures and Results of a Test of Significance of the Difference Between the Mean Scores of TPACK and its Dimensions among Prospective Teachers: Residence – Wise

Dimension	Variable	Sub-Variable	N	Mean	SD	t-value	Significance at 0.05 level
TK	Residence	Urban	33	25.1818	6.38090	0.77	Not Significant
		Rural	67	26.1642	5.14810		
PK	Residence	Urban	33	19.8485	2.99083	0.28	Not Significant
		Rural	67	19.6716	2.77100		
CK	Residence	Urban	33	18.3636	1.31857	0.51	Not Significant
		Rural	67	18.5373	2.01756		
TPK	Residence	Urban	33	12.6364	3.52507	0.81	Not Significant
		Rural	67	13.2537	3.67359		
TCK	Residence	Urban	33	18.4545	7.10234	1.17	Not Significant
		Rural	67	16.8657	4.46839		
PCK	Residence	Urban	33	19.4242	2.76168	2.08	Significant
		Rural	67	18.1045	3.36711		
TPACK	Residence	Urban	33	12.2424	1.62077	0.69	Not Significant
		Rural	67	12.5075	2.08438		

The above table shows that the t-values 0.77, 0.28, 0.51, 0.81, 1.17, and 0.69 were less than the table value 1.96 at a 0.05 level of significance. Therefore there is no significant difference in TK, PK, CK, TPK, PCK and TPACK among the prospective teachers – **Hypothesis Accepted**

The above table shows that the t-value of 2.08 is higher than the table value of 1.96 at a 0.05 level of significance. This shows that there is a significant difference in PCK among prospective teachers. Further, it shows that prospective teachers from the urban area have a high level of Pedagogical Content knowledge than prospective teachers from a rural area – **Hypothesis Rejected**

Conclusion

Technology became a part and partial of the education system, and having enough knowledge and skill in integrating technology into the teaching and learning process is very much essential for teachers and future teachers. The findings of the studyshow that the prospective teachers have above-average level of Technological Knowledge, Pedagogical Knowledge, Content Knowledge, Technological Pedagogical

Knowledge, Technological Content Knowledge, and Pedagogical Content Knowledge, but they are struggling toproperly blend all three. Knowing Technology will be more effective only when the prospective teachers know how to integrate it efficiently along with pedagogy and content. The finding reveals that Prospective teacher's Technological Pedagogical and Content Knowledge (TPACK), is below average level. Therefore Proper hands-on training Programmes and workshops should be provided for the prospective teachers so that they can get a clear idea and skill in blending technology along with pedagogy and Content knowledgethus in future as a teacher they can make the teaching-learning process efficiently and effectively among digital natives and prepare them for the future world.

References

1. Adalar, H. (2021). Social Studies Teacher Candidates' Self-Efficacy Beliefs for Technological Pedagogical Content Knowledge (TPACK). International Journal of Education and Literacy Studies, 9(3), 169. https://doi.org/10.7575/ aiac.ijels.v.9n.3p.169
2. Akturk, A. O., & Ozturk, H. S. (2019). Teachers' TPACK levels and students' self-efficacy as predictors of students' academic achievement. International Journal of Research in Education and Science, 5(1), 283–294.
3. BAŞARAN, B. (2020). Examining Preservice Teachers' TPACK-21 Efficacies with Clustering Analysis in Terms of Certain Variables. Malaysian Online Journal of Educational Technology, 8(3), 84–99. https://doi.org/10.17220/ mojet .2020.03.005
4. Dikmen, C. H., & Demirer, V. (2022). The role of technological pedagogical content knowledge and social cognitive variables in teachers' technology integration behaviours. Participatory Educational Research, 9(2), 398–415. https://doi.org/ 10.17275/per.22.46.9.2
5. Lachner, A., Fabian, A., Franke, U., Preiß, J., Jacob, L., Führer, C., Küchler, U., Paravicini, W., Randler, C., & Thomas, P. (2021). Fostering pre-service teachers' technological pedagogical content knowledge (TPACK): A quasi-experimental field study. Computers & Education, 174, 104304. https://doi.org/10.1016/ j.compedu.2021.104304
6. Mishra P & Koehler MJ (2006). Technological pedagogical content knowledge: A frameworkfor teacher knowledge. Teachers College Record, 108(6):1017–1054. Available at http://citeseerx.ist.psu.edu /viewdoc/download? doi=10.1.1. 523. 3855 &rep=rep1&type=pd.
7. Schmid, M., Brianza, E., & Petko, D. (2020). Developing a short assessment instrument for Technological Pedagogical Content Knowledge (TPACK.xs) and comparing the factor structure of an integrative and a transformative model. Computers and Education, 157(July), 103967. https://doi.org /10.1016/j.compedu.2020.103967

8. Tafli, T. (2021). A comparative study on TPACK self-efficacy of prospective Biology teachers from the faculties of education & science: TPACK self-efficacy of prospective Biology …. International Journal of Curriculum and Instruction, 13(3), 2957–2980. http://ijci.wcci-international.org/index.php/IJCI/article/view/787