



STANDARDIZATION OF TECHNOLOGICAL PEDAGOGICAL AND CONTENT KNOWLEDGE (TPACK) SCALE

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ABSTRACT

The main aim of the Technological, Pedagogical and Content Knowledge (TPACK) Scale is to assess the prospective teachers' knowledge and competencies in integrating technology into their teaching practices. This article explains the procedure of construction and standardization process of TPACK scale. The investigator has been developed the preliminary form of TPACK scale consists of seventy (70) statements with seven dimensions such as Technology Knowledge (TK), Pedagogy Knowledge (PK), Content Knowledge (CK), Technological Pedagogical Knowledge (TPK), Pedagogical Content Knowledge (PCK), Technological Content Knowledge (TCK) & Technological, Pedagogical and content knowledge (TPACK) and the sample of the study was collected randomly from the 60 prospective teachers of Namakkal district of Tamilnadu, India. The item analysis was done. The Cronbach's Alpha was used to verify the internal consistency of the TPACK scale. This scale will be useful to assess the TPACK skills of prospective teachers.

Keywords: Standardization, Technology, Pedagogy, Content, Knowledge, TPACK Scale.

INTRODUCTION

Technology is an essential part of teaching and learning in education at recent scenario, which brings the best instructions which effect on learning positively. The technology in education and technology of education are uniting three domains of knowledge cover the major areas with respect to technology, pedagogy and content.

According to Koehler and Mishra, (2006) stated that the relationships and the complexities among three basic domains of knowledge such as, technology, pedagogy and content.

TECHNOLOGICAL, PEDAGOGICAL AND CONTENT KNOWLEDGE (TPACK)

Technological, Pedagogical and Content Knowledge (TPACK) is refers to “the knowledge and skills required for the teachers to teach the subject matter (Content) effectively with help of innovative educational or teaching methods (Pedagogy) and utilize the proper educational technology (Technology)”.

- **Technological pedagogical and content knowledge (TPACK):** Technological pedagogical and content knowledge refers to the knowledge required by teachers for integrating technology into their teaching in any content area. Teachers have a perceptive understanding of the difficult interplay between the three basic components of knowledge, such as
- **Technology knowledge (TK):** Technological Knowledge (TK) concentrates on how teachers demonstrate professional knowledge of technology. It reflects on what is required for teachers to integrate technology tools and resources into their course content and teaching practice. For teachers, TK not only deals with knowledge about technology but also knowledge of the skills required to apply technology to effectively plan instruction, including with teachers.
- **Pedagogical knowledge (PK):** Pedagogical Knowledge (PK) addresses how teachers demonstrate professional knowledge of pedagogy. It refers to the specific knowledge about teaching such as approaches or methods of how teachers teach a particular topic or how to scaffold a concept to the diverse interests and abilities of learners. For instructors and professors, an effective teaching method that engages students in higher-order activities using real-world examples facilitated through different learning styles is the keystone of teaching and learning in the current scenario.
- **Content knowledge (CK):** Content knowledge (CK) is refers to the knowledge about real subject matter that is to be learned or taught. It is placed within the following definitional parameters of a teacher's knowledge about a particular subject matter and how it is taught and learned. As Shulman, (1986) noted that the content knowledge includes knowledge of concepts, theories, ideas, organizational frameworks, knowledge of evidence and proof, as well as established practices and approaches toward developing such knowledge. For teachers, effective content instruction that employ students in higher-order activities using authentic, real-world examples facilitated through technology is the basis of teaching and learning in the present education system.
- **Technological content knowledge (TCK):** Technological content knowledge deals with the knowledge of technology can create new representations for particular content. It advises that the teachers understand that using a specific technology, they can change the way learners practice and understand concepts in a particular content area. The technological content knowledge deals outline of types of knowledge needed by teachers for successful integration of technology in teaching and learning. It implies that teachers required knowing about the intersections of technology, pedagogy and content.
- **Pedagogical content knowledge (PCK):** Pedagogical content knowledge refers to the content knowledge that deals with the teaching process (Shulman, L. 1986). Pedagogical content knowledge is different for various content areas, as it combines both content and pedagogy with the goal being to

develop better teaching practices in the content areas. The pedagogical content knowledge is also called craft knowledge.

➤ **Technological pedagogical knowledge (TPK):** Technological pedagogical knowledge means, the knowledge of how various technologies can be used in teaching and to understanding that using technology may change the way of teachers to teach and also it is used by teachers to describe their understanding of how specific technologies can change both the teaching and learning processes by providing new pedagogical challenges and attributes.

OBJECTIVE OF THE STUDY

The aim of this study is to construct and standardise the “Technological Pedagogical and Content Knowledge (TPACK) scale” for prospective teachers to measure the teaching competencies of prospective teachers in their classroom.

CONSTRUCTION OF THE SCALE

For the construction of the tool, the researcher reviewed that the following sources such as previous articles, e-journals, research publications, related books, magazines and news papers report related to Technological, Pedagogical and content knowledge (TPACK). This scale has been constructed with 70 statements based on the components of TPACK. This scale have the following elements such as Technological Knowledge (TK), Pedagogical Knowledge (PK), Content Knowledge (CK), Technological Pedagogical Knowledge (TPK), Pedagogical Content Knowledge (PCK), Technological Content Knowledge (TCK) and Technological, Pedagogical and content knowledge (TPACK).

For the pilot study, the researcher had approached 60 prospective teachers who were studied in the Colleges of Education of Namakkal district, Tamil Nadu, India. The samples were selected based on random sampling technique. The researcher disseminated the scale (hard copy) to respondents and systematically collected the data. The prepared scale has been submitted to the professors who are working in the colleges of education for getting guidance and suggestions. Based on the suggestions, corrections were carried out in the prepared scale. Thus the validity of the scale was established.

ITEM ANALYSIS PROCEDURE

Item analysis is a statistical technique used to evaluate the quality and effectiveness of individual test questions or items on a test. It involves analysing the outcomes of each item to determine its difficulty level, discrimination power, validity and reliability. The scale has consists of 70 statements and collected from 60 prospective teachers. The internal consistency is a reliability assessment method to measure the internal relationship among each item of the scale.

The following formula can compute the Cronbach's alpha value

$$\alpha = \left(\frac{k}{k-1} \right) \left(1 - \frac{\sum_{i=1}^k \sigma_{y_i}^2}{\sigma_x^2} \right)$$

where

- k = Total number of scale items.
- $\sigma_{y_i}^2$ = Variance related to item i and
- σ_x^2 = Variance associated with the observed total scores

Table No.: 1

ALPHA VALUE FOR BEFORE THE ITEM ANALYSIS

Cronbach's Alpha	Cronbach's Alpha based on Standardized Items	Number of Items
0.941	0.945	70

From the Alpha value analysis for Cronbach's alpha reliability value, the investigator interpreted that the high level of internal consistency occurred among the items of scale based on the alpha value was **0.941**.

Table No.: 2

DISTRIBUTION OF THE SELECTED AND NOT SELECTED ITEMS

Statement No.	Statements	Mean if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted	Remarks
TECHNOLOGICAL KNOWLEDGE					
S1	I have acquired sufficient knowledge about educational technology.	210.03	0.344	0.941	Selected
S2	I know the advantages of educational technology.	210.06	0.595	0.940	Selected
S3	I have acquired the skills to use educational technologies.	210.27	0.439	0.940	Selected
S4	I am learning the concepts related to educational technologies.	210.06	0.531	0.940	Selected
S5	I use educational technologies to perform my daily educational activities efficiently.	210.81	0.284	0.942	Selected
S6	I am aware of the modern technologies needed to make me a better teacher.	210.27	0.474	0.940	Selected
S7	My knowledge has not improved through seminars related to educational technology.	210.03	0.390	0.941	Selected

S8	I do not have sufficient knowledge to use devices such as computer, tablet, and Smartphone effectively.	210.03	0.339	0.941	Selected
S9	I have not received special training in handling educational technology strategies.	210.25	0.201	0.942	Not Selected
S10	I feel that educational technologies make teachers and students lazy.	209.47	0.239	0.941	Not Selected

PEDAGOGICAL KNOWLEDGE

S11	I am aware of the importance of teaching objectives.	209.98	0.203	0.941	Not Selected
S12	I have a thorough understanding of the teaching stages.	210.23	0.518	0.940	Selected
S13	I am well known of the microteaching cycle.	209.89	0.361	0.941	Selected
S14	I do not handle the classroom teaching processes properly.	209.61	0.347	0.941	Selected
S15	I use various teaching strategies in classroom teaching.	209.96	0.297	0.941	Selected
S16	I use various psychological strategies to know the mood of the students during classroom teaching.	210.051	0.388	0.941	Selected
S17	I am well aware of the need for lesson plan in teaching.	209.89	0.471	0.940	Selected
S18	I do not have in-depth knowledge of various teaching methods.	209.67	0.070	0.942	Not Selected
S19	I have not realized the needs of student-centered teaching.	210.00	0.465	0.940	Selected
S20	I do not understand the need for follow-up in teaching.	209.94	0.671	0.939	Selected

CONTENT KNOWLEDGE

S21	I have acquired sufficient knowledge in my subject.	209.98	0.731	0.939	Selected
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S22	I am familiar with the basic concepts and principles in my subject.	210.03	0.562	0.940	Selected
S23	I am aware of the important principles of my subject.	209.96	0.488	0.940	Selected
S24	I am familiar with the recent trends in my subject.	210.30	0.706	0.939	Selected
S25	I do not have deep knowledge in my subject.	210.23	0.734	0.939	Selected
S26	I collect and use the books written by various authors to teach my subject.	210.06	0.571	0.940	Selected
S27	I do not improve my subject knowledge through the Internet.	209.94	0.496	0.940	Selected
S28	I do not discuss my subject concepts with my classmates.	210.13	0.283	0.942	Selected
S29	I do not revise my subject concepts.	209.61	0.276	0.941	Selected
S30	I do not go to the library to develop my subject knowledge.	209.61	0.262	0.941	Not Selected

TECHNOLOGICAL PEDAGOGICAL KNOWLEDGE

S31	I use appropriate educational technologies to teach my subject.	210.11	0.518	0.940	Selected
S32	I am constantly using modern educational technologies in my classroom teaching.	210.23	0.520	0.940	Selected
S33	I am aware of the need to handle technologies in my classroom teaching.	210.11	0.715	0.939	Selected
S34	I am fully aware of the technologies required for classroom teaching.	210.25	0.573	0.940	Selected
S35	I am unable to recommend appropriate technologies to improve the learning skills of my students.	210.22	0.702	0.939	Selected

S36	I am unable to combine modern technologies with the conventional teaching methods in my classroom.	210.32	0.700	0.939	Selected
S37	I am not knowledgeable enough to experiment with new technologies in teaching and learning in the classroom.	209.96	0.503	0.940	Selected
S38	I have not understood the importance of teaching software.	209.98	0.656	0.939	Selected
S39	I have mastered teaching technology strategies on my own.	210.28	0.455	0.940	Selected
S40	I am well aware of that teaching and technology work together.	209.81	0.316	0.941	Selected

PEDAGOGICAL CONTENT KNOWLEDGE

S41	I assess students' subject knowledge using various assessment strategies.	210.10	0.522	0.940	Selected
S42	I do not use various teaching methods in the classroom.	209.98	0.339	0.941	Selected
S43	I teach subject concepts in a way that stimulates students' critical thinking.	209.88	0.008	0.942	Not Selected
S44	My classroom teaching is conducted in a way that develops students' creativity.	209.83	0.430	0.941	Selected
S45	I do not provide exercises that consolidate students' subject knowledge in my teaching.	210.00	0.503	0.940	Selected
S46	My subject is not taught based on the classification of teaching objectives.	210.03	0.344	0.941	Selected
S47	I use diagnostic tests for students in teaching.	210.01	0.349	0.941	Selected
S48	I do not teach include academic and social values in my lessons.	210.03	0.562	0.940	Selected
S49	I do not teach lessons without teaching aids.	209.91	0.237	0.941	Not Selected

S50	I use various teaching methods to conduct lessons.	210.32	0.388	0.941	Selected
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TECHNOLOGICAL CONTENT KNOWLEDGE

S51	I develop deep knowledge in my subjects with the help of technology.	209.98	0.287	0.941	Selected
S52	I do not use adequate technology to clarify subject concepts.	210.08	0.292	0.941	Selected
S53	I choose appropriate technology to understand my subject concepts.	210.11	0.315	0.941	Selected
S54	I am not aware of the impact of the development of modern technologies on my subject.	210.00	0.355	0.941	Selected
S55	I am aware of how my subject concepts have been strengthened by technology.	210.05	0.645	0.940	Selected
S56	I download and use various subject concepts from the websites.	209.79	0.103	0.942	Not Selected
S57	I use technology to select subject concepts to excel in my subject.	210.08	0.594	0.940	Selected
S58	I prepare the suitable learning aids for my subject concepts with the help of technology.	210.27	0.484	0.940	Selected
S59	I am aware of the impacts of social media on my subject areas.	210.33	0.437	0.941	Selected
S60	I am using various technologies in my subject assessment.	210.01	0.169	0.942	Not Selected

TECHNOLOGICAL PEDAGOGICAL CONTENT KNOWLEDGE

S61	I choose teaching methods and appropriate educational technologies for my subjects and teach them.	210.06	0.554	0.940	Selected
S62	I do not identify difficult subject areas in my subject and use appropriate teaching strategies and technologies to teach them.	209.81	0.014	0.942	Not Selected

S63	I do not use teaching methods with technology in my classroom to improve my teaching skills.	210.06	0.595	0.940	Selected
S64	I do not guide students to use educational technologies to help them prepare their own assignments for their subjects.	209.94	0.671	0.939	Selected
S65	I advise students to use educational technologies to do their own subject-related exercises.	210.06	0.531	0.940	Selected
S66	I do not use online teaching to teach lessons.	210.10	0.497	0.941	Selected
S67	Social media greatly assists me in conducting lessons.	210.20	0.352	0.941	Selected
S68	Technologies greatly help me in meeting the expectations of students in teaching lessons.	209.81	0.224	0.942	Not Selected
S69	I adapt teaching methods using technologies according to the nature of the lessons.	210.05	0.535	0.940	Selected
S70	I do not use various technologies to conduct and complete lessons effectively.	210.03	0.344	0.941	Selected

The ensuing statements S9, S10, S11, S18, S30, S43, S49, S56, S60, S62 and S68 has lower Cronbach's Alpha value which were below 0.270 in the analysis. Therefore, the investigator took the decision to remove the following statements S9, S10, S11, S18, S30, S43, S49, S56, S60, S62 and S68. After completion of the item analysis, the investigator prepared the final draft of the tool has 59 statements were selected meanwhile 11 statements were not selected in 70 statements.

CONCLUSION

The investigator has been developed the preliminary form of TPACK scale consists of seventy (70) statements with seven dimensions such as Technology Knowledge (TK), Pedagogy Knowledge (PK), Content Knowledge (CK), Technological Pedagogical Knowledge (TPK), Pedagogical Content Knowledge (PCK), Technological Content Knowledge (TCK) and Technological, Pedagogical and content knowledge (TPACK) and the sample of the study was collected randomly from the 60 prospective teachers of Namakkal district of Tamilnadu, India. The item analysis was done and the Cronbach's Alpha was used to verify the internal consistency of the scale. This scale will be useful to assess the TPACK skills of prospective teachers.

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