

LEVEL OF TECHNOLOGICAL PEDAGOGICAL CONTENT KNOWLEDGE (TPACK) AMONG NATIONAL SECONDARY SCHOOL TEACHER IN KUALA LUMPUR

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Abstract – The quality of teachers nowadays depends on their competencies. One of the important competencies is the knowledge possessed by the teacher. Mastery the Technological Pedagogical Content Knowledge or known as TPACK is a complete knowledge which that gives an added value to a teacher's quality. This study aims to identify the level of TPACK among national secondary school teachers in Kuala Lumpur Federal Territory. TPACK is a comprehensive knowledge model consisting of 7 sub-dimensions of knowledge specifically Content Knowledge (CK), Pedagogical Knowledge (PK), Technological Knowledge (TK), Pedagogical Content Knowledge (PCK), Technological Content Knowledge (TCK), Technological Pedagogical Knowledge (TPK) and Technological Pedagogical Content Knowledge (TPACK). TPACK represents the knowledge required by every teacher in the 21st Century. Align with today's education climate, teachers should not only rely on the content and pedagogical knowledge, but they should also integrate technology with their content and pedagogical knowledge to ensure the teaching and learning process meets the needs of modern-day education that relies heavily on technology. This study is a quantitative study and data was collected through a questionnaire containing 30 items. A total of 462 secondary school teachers from 3 main zones in Kuala Lumpur Federal Territory (Bangsar/Pudu, Keramat and Sentul) completed the questionnaire. The data obtained was analysed using descriptive statistics to obtain the mean value and standard deviation of the respondents' TPACK level. The results show that the level of TPACK among national secondary school teachers in Kuala Lumpur Federal Territory is at a moderately high level. Meanwhile, the overall mean value and standard deviation recorded are mean = 3.92, sd = .394 respectively. The Ministry of Education (MOE) should implement impactful initiatives to ensure teachers in the education system able to perform duties and responsibilities with excellence by mastering TPACK at a high level.

Keywords – Level, TPACK, Content, Pedagogical, Technology, National Secondary School, Teacher

I. INTRODUCTION

Knowledge is one of the significant competencies that must be owned by a teacher (Medley & Shannon, 1994). Today, the teacher is deemed to have more than a piece of content knowledge in performing their task as an educator.

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In performing a task and responsibilities as a teacher, they need to consider various knowledge that fits the situation, especially in the teaching and learning process. The teaching and learning process will be easier for both parties either teacher or student if the teacher has the right knowledge and deliver them accordingly suiting the needs of the student. Students nowadays are advanced and able to choose and evaluate the learning process desired by them. Hence teachers are responsible to craft and tailor the teaching and learning environment to fulfil the need of the students. Having and practicing suitable knowledge is one of the key factors in fulfilling the students' demand, teacher should be able to position themselves as someone who is knowledgeable in various aspect, and not only to one component or dimension of knowledge, but it should be covering all dimension of knowledge.

Through Malaysian Education Blueprint 2013 – 2025 demanding teacher to be more knowledgeable in order to realize the aspirations of national education (MOE, 2013).

Technological Pedagogical Content Knowledge (TPACK) framework provides a comprehensive knowledge component that should be mastered by each educator to become a knowledgeable teacher. The 3 main components of TPACK are content, pedagogy and technology integrating from one to another in forming a joined knowledge (Koehler & Mishra, 2006).

II. PROBLEM STATEMENT

Today's education system is challenging as compared to 20 years ago. Teacher's knowledge is one of the key factors in determining the success of the teaching and learning process. Teaching and learning process involves two parties; student and teacher. Hence, teachers need to be equipped with significant and comprehensive knowledge. Without having a comprehensive knowledge teachers might not be able to deliver and sustain an education system.

Today's students are more intelligent and selective in adapting what they learned, in addition to the undeniable use of technology in today's life, this situation requires teachers not only depending on basic knowledge however taking into consideration the element of technology into their current knowledge. Technology has created new ways for students to learn for example information is impossible to be shared without internet technology. By not following the beat of a more modern education system it is possible that teachers might be far behind when compared to students. Technology elements play a very significant role especially in education

systems. The failure of teachers who cannot afford to blend between technology and education will tremendously give a bad impact on the student.

III. LITERATURE REVIEW

TPACK Framework

Technological Pedagogical Content Knowledge or known as TPACK was originally an idea developed by Schulman in 1986 consist of Pedagogical Content Knowledge (PCK) framework only. The PCK framework was improvised by putting the element of technology into the framework and become the current TPACK framework (Koehler & Mishra, 2006). Earlier on, TPACK was spell as TPCK only, however it was agreed and decided to add "A" for "and" in between of TP and CK. The purpose of rename the spelling was to give an impact on pronunciation and it is easier for people to remember it (Thompson & Mishra, 2007).

TPACK comprising of 7 sub-dimensions' knowledge namely Content Knowledge (CK), Pedagogical Knowledge (PK), Technological Knowledge (TK), Pedagogical Content Knowledge (PCK), Technological Content Knowledge (TCK), Technological Pedagogical Knowledge (TPK) and Technological Pedagogical Content Knowledge (TPACK) (Koehler & Mishra, 2006; Mishra, Koehler, & Henriksen, 2011; Schmidt, Baran, Ann, Mishra, & Koehler, 2009). According to (American Association of Colleges of Teacher Education and the Partnership for 21st Century Skills P21, 2010) TPACK framework highlights the type of knowledge required by teachers to integrate technology in majority of areas effectively.

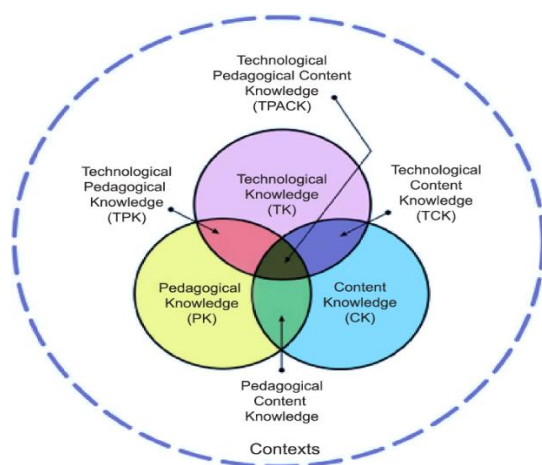


Figure 1. TPACK Framework. -Koehler and Mishra, 2006

Content Knowledge (CK) refers to the subject being taught including theories, concepts and others (Schmidt, Baran, Ann, Mishra, & Koehler, 2009).

Pedagogical Knowledge (PK) refers to the method, technique, process and procedure that are integrated into teaching and learning in the classroom (Koehler & Mishra, 2006).

Technological Knowledge (TK) refers to standard pen

and paper technology, including books and whiteboards. On the other hand, advanced technology associate with the internet and digital videos (Koehler & Mishra, 2006). Computer hardware, the word processor, spreadsheets, browser and email are examples of digital technologies. TK also includes ways of installing and removing devices, software programs and creating and archiving documents (Koehler & Mishra, 2006).

Pedagogical Content Knowledge (PCK) denotes the teaching methods which are suitable to the content and vice versa. PCK is reflected through knowing how content components can be organized to improve teaching (Koehler & Mishra, 2006).

Technological Pedagogical Knowledge (TPK) refers to the competence of numerous technologies being used in teaching and learning (Koehler & Mishra, 2006).

Technological Content Knowledge (TCK) refers to the knowledge of how technology can create new representations of particular knowledge (Schmidt et al., 2009).

Technological Pedagogical Content Knowledge (TPACK) refers to the knowledge to integrate technology into the pedagogical approaches in teaching in a subject area (Schmidt et al., 2009). It can be said that TPACK is a knowledge combining of content, pedagogy and technology (Koehler, Mishra, & Cain, 2013).

IV. METHOD

Research Design

This study used a quantitative approach for data collection. The survey method was employed to identify level of TPACK among national secondary school teacher in Kuala Lumpur Federal Territory.

Instrument

Instrument were developed from the literature review and previous study pertaining to TPACK developed by (Schmidt et al., 2009). As a result, there were 30 items adopted and adapted suited to the purpose of this study. The questions using the five-level Likert scale and the scale used in this instrument ranges from 1=strongly disagree, 2=disagree, 3=least agree, 4=agree and 5=strongly agree. The content and format of the instrument were reviewed and validated by 11 expertise from 5 universities. An amended version of instrument was prepared and went through the pilot study involving 32 respondents from national secondary school teacher for the purpose of reliability and coefficient of the instruments.

Population and Sample

Population parameters for this study covered national secondary school teachers in Kuala Lumpur Federal Territory under 3 main zones namely Bangsar/Pudu, Keramat and Sentul. A total of 89 national secondary schools in KL under the 3 main zones where by total number of teacher for 89 schools were 7224. 80% out of total schools been approached however only 17% of schools willing to

participate in this study. For the purpose of this research, the sample size was 462 through easy random sampling.

Data Collection

The questionnaire was distributed via google form to the participated schools and they were given 2 to 3 weeks to provide their feedback. Since pandemic Covid-19, all respondents answered the items online and there was no hardcopy questionnaire was distributed. In order to ensure the smoothness of the data collection process, the researcher engaged with one person in charge at participated schools for the purpose of follow up on the number of respondents who responded to the questionnaire. The person in charge at participated schools were notified once the number of respondents from that particular school sufficient.

V. FINDINGS

This section shows the findings to answer the research question on level of TPACK among national secondary school teacher in Kuala Lumpur Federal Territory. Research findings also to be viewed separately for items under each TPACK sub-dimensions.

TABLE I: LEVEL OF TPACK

	Mean	SD	Level
Content Knowledge (CK)	4.15	.459	High
Pedagogical Knowledge (PK)	4.07	.418	High
Technological Knowledge (TK)	3.77	.537	Moderately high
Pedagogical Content Knowledge (PCK)	4.06	.423	High
Technological Content Knowledge (TCK)	3.81	.525	Moderately high
Technological Pedagogical Knowledge (TPK)	3.82	.514	Moderately high
Technological Pedagogical Content Knowledge (TPACK)	3.75	.539	Moderately high
Overall "Technological Pedagogical Content Knowledge" (TPACK)	3.92	.394	Moderately high

(Level: Low = 1.00 – 2.00, Moderately low = 2.01 – 3.00, Moderately high = 3.01 – 4.00, High = 4.01 – 5.00) (Nunally, 1997).

Table I, shows overall findings for level of TPACK sub-dimensions. Content Knowledge (CK), Pedagogical Knowledge (PK), Technological Knowledge (TK), Pedagogical Content Knowledge (PCK), Technological Content Knowledge (TCK), Technological Pedagogical Knowledge (TPK) and Technological Pedagogical Content Knowledge (TPACK). From the above table it shows that the score TK mean = 3.77, SD = 0.537, TPK mean = 3.82, SD = 0.514, TCK mean = 3.81, SD = 0.525, and last but not least TPACK mean = 3.75, SD = 0.539 at a highly moderate, meanwhile a high score was PK mean = 4.07, SD = 0.418, CK mean = 4.15, SD = 0.459 and PCK mean = 4.06, SD = 0.423.

Overall shows that the TPACK score was mean = 3.92, SD = 0.394 among national secondary school teacher in Kuala Lumpur Federal Territory was at moderately high level.

Content Knowledge (CK)

TABLE II: CONTENT KNOWLEDGE (CK)

No	Statement	Mean	SD
1	I have sufficient knowledge about my subject	4.41	.551
2	I know the basic theory of teaching materials	4.21	.538
3	I know about the development of important theories	3.91	.595
4	I know the latest development pertaining to the subject	4.09	.534
	Overall	4.15	.459

Table II shows the mean and SD for Content Knowledge (CK). Overall mean = 4.15, SD = .459. The highest mean score for item number 1 "I have the knowledge on the subject I am teaching" mean = 4.41, SD = .551.

Pedagogical Knowledge (PK)

TABLE III: PEDAGOGICAL KNOWLEDGE (PK)

No	Statement	Mean	SD
5	I know how to assess students' performance	4.05	.545
6	I can adapt/modify teaching based on the students' understanding	4.05	.467
7	I can adapt/modify my teaching style to cater different groups of students	4.01	.508
8	I can diversify my teaching approaches in classroom	4.07	.494
9	I know how to manage the classroom	4.17	.531
	Overall	4.07	.418

Table III shows the mean and SD for Pedagogical Knowledge (PK). Overall mean = 4.07, SD = .418. The highest mean score for item number 9 "I know how to manage the classroom" mean = 4.17, SD = .531.

Technological Knowledge (TK)

TABLE IV: TECHNOLOGICAL KNOWLEDGE (TK)

No	Statement	Mean	SD
10	I keep myself updated with new technologies	4.03	.570
11	I know different types of technology	3.67	.641
12	I know technical skills to use technology	3.60	.654
	Overall	3.77	.537

Table IV shows the mean and SD for Technological Knowledge (TK). Overall mean = 3.77, SD = .537. The highest mean score for item number 10 "I keep myself updated with new technologies" mean = 4.03, SD = .570.

Pedagogical Content Knowledge (PCK)

TABLE V: PEDAGOGICAL CONTENT KNOWLEDGE (PCK)

No	Statement	Mean	SD
13	I know how to select effective teaching approaches to guide the student in the subject	4.10	.492
14	I know about different teaching approaches that are relevant to facilitate the subject that I teach	4.02	.501
15	I can adapt the latest teaching method to	4.00	.504

	match the learning outcomes that need to be achieved		
16	I can choose a suitable assessment method for the relevant subject to measure students' achievement in fulfilling the learning outcomes	4.06	.474
17	Through teaching materials, I know how to guide students in planning their learning	4.11	.499
18	I know how to guide students to think creatively by using teaching materials	4.05	.530
Overall		4.06	.423

Table V shows the mean and SD for Pedagogical Content Knowledge (PCK). Overall mean = 4.06, SD = .423. The highest mean score for item number 17 "Through teaching materials, I know how to guide students in planning learning" mean = 4.11, SD = .499.

Technological Content Knowledge (TCK)

TABLE VI: TECHNOLOGICAL CONTENT KNOWLEDGE (TCK)

No	Statement	Mean	SD
19	I know about the technology that can be used to increase students' understanding of the subject that I teach	3.85	.563
20	I know about the technology that can be used to explain the difficult topics in the subject that I teach	3.74	.611
21	I know about the Information Communication Technology (ICT) application that can be used to increase my understanding of the teaching content	3.84	.581
Overall		3.81	.525

Table VI shows the mean and SD for Technological Content Knowledge (TCK). Overall mean = 3.81, SD = .525. The highest mean score for item number 19 "I know about the technology that can be used to increase students' understanding of the subject that I teach" mean = 3.85, SD = .563.

Technological Pedagogical Knowledge (TPK)

TABLE VII: TECHNOLOGICAL PEDAGOGICAL KNOWLEDGE (TPK)

No	Statement	Mean	SD
22	I know how to use ICT in teaching as a tool for the student to plan their own learning	3.89	.568
23	I think critically about how to use technology in the classroom	3.79	.579
24	I can adapt/modify the use of technology to diversify teaching activities	3.85	.565
25	I know various latest applications that are effective with the subject I teach	3.75	.630
Overall		3.82	.514

Table VII shows the mean and SD for Technological Pedagogical Knowledge (TPK). Overall mean = 3.82, SD = .514. The highest mean score for item number 22 "I know how to use ICT in teaching as a tool for the student to plan their own learning".

Technological Pedagogical Content Knowledge (TPACK)

TABLE VIII: TECHNOLOGICAL PEDAGOGICAL CONTENT KNOWLEDGE (TPACK)

No	Statement	Mean	SD
26	I know how to apply the use of technology in my teaching approach	3.85	.593
27	I know how to choose the technology to be used in class to improve my teaching method	3.84	.581
28	I know how to combine content, technology and teaching method in the classroom	3.75	.603
29	I can guide other teachers in coordinating the use of content, technology and teaching method at school	3.53	.689
30	I can use the technology that gives value to the subject context for the purpose of teaching	3.76	.599
Overall		3.75	.539

Table VIII shows the mean and SD for Technological Pedagogical Content Knowledge (TPACK). Overall mean = 3.75, SD = .539. The highest mean score for item number 26 "I know how to apply the use of technology in my teaching approach" mean = 3.85, SD = .593.

VI. DISCUSSION

From the result, it shows that content knowledge and pedagogical knowledge among respondents were at a high level, this situation proves that the teachers in KL have a high knowledge in the content, pedagogical knowledge as well as a combination of both sub-dimensions namely PCK, as compared to findings for TK, TCK, TPK and TPACK which was moderately high. The finding of this study were contradicted with the findings from (Bas & Senturk, 2018) shows that all TPACK sub-dimensions level among respondents were at moderate level and only TCK sub-dimension at a low level.

From these findings, it can be said that the knowledge sub-dimensions with element of technology were still not fully mastered by the respondents. Technology usage is a systematic process to increase the education value (Siti Rapidah Omar Ali, Nurzafirah Che Nordin, Nur Shafini Mohd Said, Suhaily Maizan Abdul Manaf, & Wan Mardiana Wan Musa, 2017).

VII. CONCLUSION (OR LIMITATION OR SUGGESTION FOR FURTHER STUDIES)

The limitation of this study was the population only national secondary school teachers in Kuala Lumpur Federal Territory and it is not generated by the whole national secondary school teacher in Malaysia. The respondents for future study may consider among other categories of schools for instant primary school, private school and other type of school. The respondents for future studies also may consider the category of the teacher in order to see specific results from a similar target group.

From the study, it can be concluded that teachers are encourage to expand and broader their knowledge especially those relating to the element of technology. As for this

purpose, the Ministry of Education (MOE) should implement an impactful initiative to ensure teachers in the education system able to perform duties and responsibilities with excellence by mastering TPACK at a high level.

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