

TPACK Instrument For English Language Teachers in A Malaysian Secondary School Context

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To Link this Article: <http://dx.doi.org/10.6007/IJARBSS/v12-i4/13090>

DOI:10.6007/IJARBSS/v12-i4/13090

Published Date: 28 April 2022

Abstract

Technology integration into education has seen initiatives carried out by the Malaysian government involving resource enrichment, professional development and training, and the expansion of tools and content available on multiple platforms. The teachers are at the core of realising and executing the integration of technology into classroom instruction. As such, teacher knowledge required for technology integration is of utmost importance. The Technological Pedagogical Content Knowledge (TPACK) framework proposes that a teacher needs to be equipped and competent in all the seven components: Technological Knowledge (TK), Pedagogical Knowledge (PK), Content Knowledge (CK), Pedagogical Content Knowledge (PCK), Technological Content Knowledge (TCK), Technological Pedagogical Knowledge (TPK), and Technological Pedagogical Content Knowledge (TPCK) to integrate technology effectively into their instructions. This study aims to adapt the survey of English as Foreign Language - Technological Pedagogical Content Knowledge (EFL-TPACK) by Baser et al (2015) and investigate the reliability and validity of the instrument when used in the context of Malaysian secondary school English language teachers. Twenty secondary school English language teachers in Sarawak participated in this study, and the IBM SPSS 21 was used for statistical analyses. The reliability of the instrument is at a Cronbach Alpha of 0.95 overall. The final TPACK survey included 38 items: 9 TK, 6 PK, 4 CK, 5 PCK, 3 TCK, 7 TPK, and 4 TPCK items. The survey also showed all positive inter-item correlations suggesting convergent validity. The adapted TPACK survey is found to be reliable and valid to be administered to measure the TPACK level of English language teachers in the Malaysian secondary school context.

Keywords: TPACK, Technology Integration, Teacher Knowledge, ELT, TPACK Instrument

Introduction

The leverage of technology has witnessed increased efficiency and performance of tasks by leaps and bounds, and there is hardly any aspect of daily life that is technology-free in the modern world today. In education, technology's affordances make it crucial for educators to

be knowledgeable and competent in its integration into the teaching and learning process. The 2013 - 2015 Malaysian Education Blueprint proposed 11 fundamental shifts to improve the nation's education, and one of them is to use information communications technology to scale up quality learning across Malaysia. This calls for the need to maximize technology usage to expand access to quality teaching, with learners taking charge of their educational experience and pace and teachers ideally functioning as facilitators guiding the learning process instead of merely providing the content. To produce a highly effective education system, the pre-requisite would be a high-calibre workforce of teachers whereby pre-service teachers are prepared. Hence, they are ready not only in subject matter proficiency but also in the content and pedagogical knowledge. In-service teachers would also be equipped with platforms and resources for continuous professional development to catch up on constant advancements (Ministry of Education Malaysia, 2015). Shulman (1986) states that teacher knowledge in a subject area, coined as Pedagogical Content Knowledge, differentiates teachers from non-educator specialists. In line with the growingly pertinent role of technology in education, Mishra and Koehler (2006) extended Shulman's theory of Pedagogical Content Knowledge by adding to it the aspect of Technological Knowledge. The resulting conceptual framework is the Technological Pedagogical Content Knowledge (TPACK). Schmidt et al. (2009) developed an instrument to measure pre-service teachers' TPACK level, which has since been adapted to suit many studies and research examining language teachers' TPACK (Cheng, 2017; Drajati & Tan, 2018; Hlas et al., 2017; Jwaifell, 2018; Liu et al., 2019; Nazari et al., 2019; Singh & Kasim, 2019). Baser et al (2015) developed an instrument to assess the TPACK of preservice English as Foreign Language (EFL) teachers. Although initially designed to measure the TPACK of pre-service teachers, The TPACK instrument by Baser et al (2015) has been used in studies investigating the TPACK of in-service teachers, both novice and experienced, as the domain of knowledge required by a language teacher does not differ between the two groups (Li, 2021; Nazari et al., 2019).

Significance of Study

This study is motivated by the hopes of being able to contribute theoretical significance in understanding the investigation of English language teachers' knowledge, particularly the Technological Pedagogical Content Knowledge in integrating technology into classroom instructions. The practical significance that this study hopes to offer is providing a valid and reliable instrument for studies in the context of English language teachers delivering the new CEFR-aligned curriculum in Malaysia. The study is important as the new CEFR English language curriculum in Malaysia is still in Phase Three, spanning 5 years from 2021 to 2025 whereby the new curriculum will undergo evaluation, review, and revision established on information gained via research and studies, and feedback from stakeholders such as pupils, teachers, schools (Ministry of Education Malaysia, 2015).

Aim and Objectives

This pilot study aims to adapt and validate the survey of Technological Pedagogical Content Knowledge (EFL-TPACK) by Baser et al (2015) to fit the context of the Malaysian secondary school English language instruction. The objectives of the study are

- i. To investigate the reliability of the TPACK questionnaire in the context of Malaysian secondary school English language instruction
- ii. To investigate the convergent validity of the TPACK questionnaire in the context of Malaysian secondary school English language instruction.

The research questions are

- i. What is the internal consistency of the TPACK questionnaire in terms of the Cronbach Alpha index in the context of Malaysian secondary school English language instruction?
- ii. What are the inter-term correlations of the TPACK questionnaire in the context of Malaysian secondary school English language instruction?

Technological Pedagogical Content Knowledge (TPACK) Framework

Figure 1 shows the Technological Pedagogical Content Knowledge (TPACK) proposed by Mishra and Koehler (2006) is an overarching conceptual framework for educational technology, focusing on teachers' technology integration into their pedagogy.

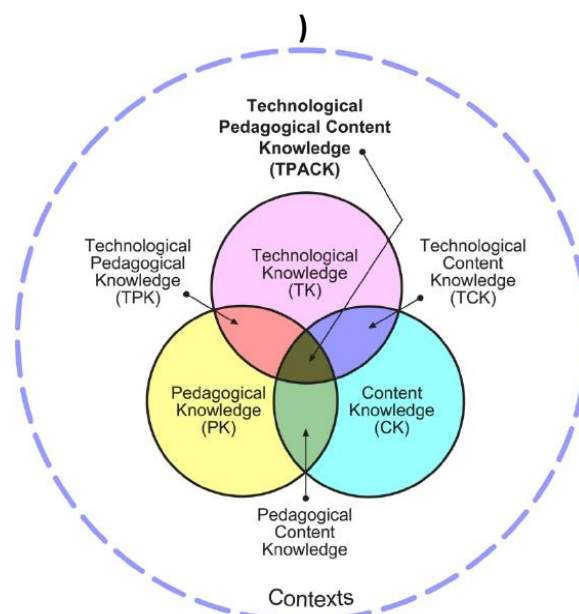


Figure 1. TPACK Theoretical Framework of Knowledge Bases (Koehler & Mishra, 2009)

Mishra and Koehler (2006) suggest that to integrate technology into their lessons effectively, teachers need to be knowledgeable in the three main components of Technological Knowledge, Pedagogy Knowledge, and Content Knowledge, and the four knowledge components of Technological Pedagogical Knowledge (TPK), Technological Content Knowledge (TCK), Pedagogical Content Knowledge (PCK), and Technological Pedagogical Content Knowledge (TPACK) identified from their interrelation. The knowledge components within the TPACK framework are summarised in Table 1 below.

Table 1: TPACK Knowledge Components, Description, and Examples

TPACK Knowledge Component	Description	Example
Technological Knowledge (TK)	Knowledge of technology tools and their usage	Ability to use online platforms such as Google Class or Wikis.
Pedagogical Knowledge (PK)	Knowledge of the best processes and methods to maximize teaching and learning, including planning, assessing, and managing classes.	Ability to create an environment or space for observational learning to help language skills acquisition.
Content Knowledge (CK)	Knowledge of the subject matter	Ability to use the correct tense form when writing a story.
Technological Pedagogical Knowledge (TPK)	Knowledge of matching effective technology tools to different pedagogical designs and teaching strategies.	Ability to use tools such as Grammarly to assist in error correction during language teaching.
Technological Content Knowledge (TCK)	Knowledge of the appropriate technology tools to integrate alongside specific learning content of a subject matter.	Ability to use authentic audio clips on media sharing platforms such as YouTube for different levels of listening tasks.
Pedagogical Content Knowledge (PCK)	Knowledge of the teaching strategies or approaches to apply when teaching the subject matter.	Ability to use collaborative learning strategies to teach speaking skills.
Technological Pedagogical Content Knowledge (TPCK)	Knowledge of the constructive usage of technologies to teach subject matter through effective teaching strategies.	Ability to use the integrative learning approach through social media platforms like Instagram and content that learners are familiar with to develop writing skills at a more complex level

TPACK Survey Instrument

Findings from the educational survey help observe the progress of reformation efforts, monitor the fidelity of implementation of policies, and establish links between the practices of educational changes and the target of the policy reforms (Desimone & Le Floch, 2004). Therefore, an instrument administered in the process of data collection must be valid and reliable in the study context. The TPACK instrument was initially developed by Schmidt et al (2009) to measure preservice teachers' self-evaluation of their Technological Pedagogical Content Knowledge and associated knowledge integrated with the framework. Under the Content Knowledge aspect, the initial instrument evaluated trainee teachers in 4 subject matters together – mathematics, social studies, science, and literacy. As such, the teachers' content knowledge that is being evaluated was not intended to focus on one single subject. To investigate specifically teachers' knowledge of their English language instructions, adaptations were made to the Schmidt et al (2009) instrument to investigate teachers' knowledge of their English language instructions. Baser et al (2015) developed the TPACK- EFL instrument to measure the TPACK level of pre-service teachers of English as a Foreign

Language in Turkey. The focus of their study was on the integration of educational technology and how they could support the communicative language teaching of the English language. Another instrument investigating TPACK among English language teachers was developed by Bostancıoğlu and Handley (2018) and was named the EFL-TPACK survey. Different from Baser et al. (2015), the instrument developed by Bostancıoğlu and Handley (2018) is more general and does not focus on specific learning theories or approaches. In the Malaysian context, TPACK instruments had also been adapted or developed to investigate teachers' TPACK under various subjects such as Science (Akun & Mohamad, 2021; Chieng & Tan, 2021; Mai & Hamzah, 2017), Mathematics (Bahador et al., 2017; Khor & Lim, 2014), Technical and Vocational Education (Chua & Jamil, 2012), and English as a Second Language (Abdul Rauf et al., 2021; Elas et al., 2019). In all these studies, the instruments have been proven to be reliable and valid in the Malaysian context. In the study by Abdul Rauf et al. (2021) which was participated by 100 secondary school ESL teachers in Sabah, the EFL-TPACK instrument by Bostancıoğlu and Handley (2018) was adapted and an exploratory factor analysis extracted a structure with six dimensions of TPACK. They are Technological Knowledge (TK), Content Knowledge (CK), Technological Content Knowledge (TCK), Technological Pedagogical Knowledge (TPK), Technological Pedagogical Content Knowledge (TPCK), and the combined dimension of Pedagogical Knowledge (PK) / Pedagogical Content Knowledge (PCK) (Abdul Rauf et al., 2021).

This study chose to adapt the instrument by Baser et al (2015) as the context of the Malaysian English language curriculum also focuses on supporting a communicative language teaching and learning environment (Ministry of Education Malaysia, 2015). Although the original instrument was developed with EFL teachers as target respondents, the EFL and ESL subject-matter area has a very similar focus on skills that are core to English language teachers. In the CK items of the survey by Baser et al (2015), Content Knowledge of the Turkish EFL curriculum is measured by teacher knowledge of speaking, writing, reading with correct pronunciation, reading, and listening. In the Malaysian CEFR curriculum for ESL learning, the four primary skills are speaking writing, reading, and listening. Different from the EFL learning focus that placed reading text with correct pronunciation as a main skill, ESL in the CEFR context categorised this under learner's speaking skills (Ministry of Education Malaysia, 2015). By removing the item that focused on reading with correct pronunciation, the CK items in the Baser et al (2015) instrument would be the most suitable as they focused on the same language skills focused in ESL learning. Furthermore, the study also wishes to focus on the integration of educational technology instead of the general usage of a broad range of technology, like those in the Baser et al (2015) study. The instrument has been proven to be a reliable, valid, and established instrument with the survey items borrowed, adopted, or adapted in studies investigating English language teachers' TPACK (Laudari & Prior, 2020; Li, 2021; Salehi et al., 2021; Sariçoban et al., 2019; Vereshchahina et al., 2018). This instrument was also chosen as it measures the same seven components suggested in the TPACK framework for technology integration by (Mishra & Koehler, 2006).

Methodology

Sample

The sample for this study is selected from 20 in-service secondary school English language teachers in Sarawak, Malaysia who has taught English lessons in the CEFR curriculum. The purposive sampling criteria are also representative of the intended sample of the main study.

The participants for this study are made up of 11 females and 9 males with ages ranging from 26 to 60 years of age. All participants have a bachelor's degree majoring in TESL. An online google form link was distributed to the participants and participants filled out the consent form before responding to the questionnaire. The duration of the pilot study was 3 months.

Instrument

This study uses quantitative and qualitative approaches to investigate the responses of participants. A questionnaire developed by Baser et al (2015) to assess the TPACK of preservice English as Foreign Language (EFL) teachers was adapted for the study. The finalised instrument consists of two sections – A and B. Section A collects demographic information on participants namely gender, age, major, years of teaching English language, APTIS (English language proficiency assessment scored against standardised British Council bands of A1, A2, B1, B2, C1, C4 from basic to high proficiency) test result, school category of urban or rural, and an open-ended question to participants asking what technology is, in the context of their role as a teacher. Section B consists of 38 items in a 5-point Likert scale questionnaire collecting information on participants' Technological Pedagogical Content Knowledge. The TPACK questionnaire items are scored with a 5-point Likert scale with 1=Strongly Disagree; 2=Disagree; 3=Neither Agree nor Disagree; 4=Agree; and 5=Strongly Agree. There are no negative statements in the items of the TPACK survey. Table 2 shows the distribution of items for the survey questionnaire.

Table 2: TPACK components and number of items of the TPACK instrument

	Number of Items
Technological Knowledge	9
Content Knowledge	4
Pedagogical Knowledge	6
Pedagogical Content Knowledge	5
Technological Content Knowledge	3
Technological Pedagogical Knowledge	7
Technological Pedagogical Content Knowledge	4
TOTAL	38

As the original instrument focused on EFL, several items focusing on EFL strategies and skills were revised to fit the ESL context of the intended main study. An item in the CK component of the original survey by Baser et al (2015) intended to measure listening comprehension was revised from *"I can understand the speech of a native English speaker easily"* to *"I can understand what I listen to in English"*. Another CK component, *"I can read texts written in English with the correct pronunciation"*, is also removed. These revisions are done to parallelise the investigated aspects with the core agenda of the Malaysian CEFR English language teaching and learning context, which is competent communicative ability instead of accuracy (Ministry of Education Malaysia, 2015). Similarly, two items in TCK focusing on communicating with foreigners and multilingual communities were revised to fit the ESL context in Malaysia. Therefore, the other items in line with the knowledge and skills required by an ESL instructor in the Malaysian classroom are retained. The items that are revised in the CK and TCK for this study are shown in Table 3 below.

Table 3: Revision of items in the CK and TCK

Item	Original	Revised
CK4	<i>I can understand the speech of a native English speaker easily</i>	I can understand what I listen to in English
CK5	<i>I can read texts written in English with the correct pronunciation</i>	Removed
TCK2	<i>I can use collaboration tools (e.g. Second Life, wiki) to work collaboratively with foreign persons</i>	I can use collaboration tools (e.g. Padlet, Google Classroom, Wikispaces) to work collaboratively with other users of English.
TCK3	<i>I can benefit from using technology (e.g. web conferencing and discussion forums) to contribute at a distance to multilingual communities.</i>	I can benefit from using technology (e.g. web conferencing and discussion forums) to contribute to communities with users of English.

Results and Discussion

Cronbach's Alpha is a good measure of reliability and more precisely, the internal consistency of a survey (Creswell, 2010). The current study reported internal consistency of items that are as good as the original survey by (Baser et al., 2015). The Cronbach Alpha index according to each TPACK component is shown in Table 4 below.

Table 4: Comparison of Internal Consistency

TPACK Components	α	
	Current	Baser et al. (2015)
TK	.87	.89
CK	.92	.88
PK	.89	.92
PCK	.82	.91
TCK	.61	.81
TPK	.88	.91
TPCK	.70	.86
Total Item	38	39
n	20	174
alpha	0.95	

The scale reliability for the seven components ranged from the lowest of 0.61 for the CK component to the highest of 0.92 for the TCK component. The other components reported the alpha value of 0.87, 0.89, 0.82, 0.88, and 0.70 for TK, PK, PCK, TPK, and TPCK respectively. The overall reliability value index of the TPACK survey showed a Cronbach Alpha of 0.95, which is above the preferred index of internal consistency > 0.60 (Creswell, 2010). An analysis of the inter-item correlation matrix and item-total statistics within the TCK scale was done as the reported Alpha of 0.61 was only slightly above the acceptable index of internal consistency $> .60$ (Creswell, 2010).

Table 5: Inter-Item Correlations (r)

	TK	CK	PK	PCK	TCK	TPK	TPCK
TK	1.000	.047	.568	.231	.370	.691	.538
CK		1.000	.328	.315	.698	.189	.399
PK			1.000	.689	.859	.875	.956
PCK				1.000	.822	.589	.835
TCK					1.000	.705	.922
TPK						1.000	.898
TPCK							1.000

The analysis of the inter-item correlation matrix shown in Table 5 reported all positive inter-item correlations for the seven domains of TPACK, which suggested convergent validity of the survey ranging from the lowest value $r = .231$, between TPCK and PK, to the highest, $r = .956$.

Table 6: Item-Total Statistics for TCK Scale

Item		Cronbach's Alpha if Item Deleted
TC K1	<i>I can take advantage of multimedia (e.g. video, slideshow) to express my ideas about various topics in English.</i>	.734
TC K2	<i>I can use collaboration tools (e.g. Padlet, Google Classroom, Wikispaces) to work collaboratively with others in English.</i>	.213
TC K3	<i>I can benefit from using technology (e.g. web conferencing, discussion forums) to contribute to communities in English.</i>	.463

The inter-item correlation analysis shown in Table 6 reported that Item TCK 1: “I can take advantage of multimedia (e.g. video, slideshow) to express my ideas about various topics in English”, had lower correlations with the other items in the scale and when deleted, would raise the Cronbach Alpha of the TCK measure to .734. One-to-one cognitive interviews were done to better understand the suspicious item, and to gain insight into how participants understand and respond to items in the survey (Ryan et al., 2012). To understand the item TCK1 better, participants’ responses were analysed and two participants were selected for the interview. Responding to the TCK1 statement, 18 out of the 20 participants responded with 4 (Agree) or 5 (Strongly Agree). Two participants who responded with 3 (Neither Agree nor Disagree), were selected for the interview as they were deemed to have responded differently from the rest of the group. The interviews were conducted through online platforms, recorded, and transcribed. For the TCK1 statement, one participant responded saying, “Take advantage of multimedia? Does that mean I create the multimedia, or do I use ready-made content?” and “Do you mean expressing the ideas I have of English topics or are you asking about expressing my ideas with the English language?”. The participant suggested that “A brief explanation should be included in the sub-headings” and “Maybe describe in the different segments what each of the sections are measuring. Then it is clear if we are focusing on the technology, the content, the language, or all of them”. The other participant responded that “the example of usage provided in the TCK1 item made it difficult to decide compared to TCK2 and TCK3 because I can recall immediately that I have used the tools in the examples during teaching before this” and “I could not decide if the question meant producing my own videos, or just stream them from platforms like YouTube and TikTok”. The

participant added stating “Technology encompasses too many things in a lesson. If you make the examples specific it will make it clearer for the respondents”. The participant explained that their choice in responding with 3 (Neither Agree nor Disagree) was due to not being able to comprehend the item entirely. Three other participants who gave consent were also interviewed to ensure the items were functioning as intended. They have all expressed that they have not faced difficulties in understanding the items and could decide almost immediately based on their own teaching experience. Even for TCK1, they have expressed that it was not a problem, and one participant responded by saying, “I could understand the scope when I looked at the examples in the other items of the same component if I was unsure at any point”. Through the interview responses, it can be summarised that items were mostly easy to understand and respond to. Therefore, revisions of the items are deemed unnecessary. Although item TCK1 might be confusing, participants were able to decide what to respond to immediately when explained during the interview. This indicated the need to provide a brief explanation to the respondent before the instrument is administered. Although items do not require revision, a suggestion to help participants understand items better is by including brief explanations under the heading for every component. This could also be done by including examples of educational technology tools that teachers may be more familiar with in the Malaysian teaching context in the example. Additionally, a better understanding of the TPACK framework and each component is also needed to help the participants respond to the items in the questionnaire.

Conclusion

The purpose of this study was to adapt the Survey of Technological Pedagogical Content Knowledge (TPACK) by Baser et al (2015) and to investigate its reliability and validity to be administered in the Malaysian secondary school ESL instruction context. The participants were 20 ESL secondary school teachers from Limbang, Lawas, Baram, and Miri districts in Sarawak, Malaysia. The present study contributes to the validation of the survey instrument, particularly in the context of ESL secondary school teachers in the state of Sarawak. The reliability of the TPACK survey showed a high Cronbach's Alpha value, >0.60 , and the positive inter-item correlations in the survey suggested convergent validity. This reflects that the items included in the final TPACK survey are applicable and that the instrument has internal consistency and is stable across samples. Therefore, the current TPACK survey is reported appropriate to be applied in the Malaysian secondary school ESL instruction context.

Acknowledgement

This study has been carried out under the Federal Training Grant provided by Ministry of Education of Malaysia (MOE), and guidance by Rosnah Bt Mustafa and Dr Monaliza Bt Haji Sarbini of Universiti Malaysia Sarawak.

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