Non-Optionist Primary English Second Language Teachers' Technological Pedagogical Content Knowledge (TPACK) Competence

Soh Yu Xuan, Chan Mei Yi, and Melor Md Yunus

Abstract – **Technology has grown into a knowledge resource that can be incorporated into the subject matter being instructed, in spite of acting as a teaching tool. English language educators who are not competent will have an inauspicious influence on students' language learning performance despite all endeavour to bolster educational establishment. Thus, it is necessary for the teachers as the main driving force to be competent in intertwining ICT with pedagogy and content, better known as Technological Pedagogical Content Knowledge (TPACK) for successful technology inclusion in education. Past studies have been done on teachers' TPACK competence focusing on specific subjects and factors affecting the TPACK level but there is a lack of investigation on the TPACK level with regards to the non-optionist teachers in the primary ESL teaching and the age factors. Thus, this study intends to identify non-optionist ESL teachers perceived TPACK competence in the primary ESL classroom. The method used is a quantitative descriptive approach. A web-based survey questionnaire was sent to 50 primary school teachers in Malaysia. The findings demonstrated that non-optionist ESL teachers' TPACK competence is at a moderately high level, mainly in the technology-based domains. This study likewise found that age and TPACK levels were statistical significantly related. This research may be used as a reference by school authority to provide courses or skills training for the educators or teachers who choose to introduce technology inclusion in ESL teaching and learning. Future research may focus on technology's influence on teaching skills in different subject areas.**

Keywords – **TPACK, competence, non-optionist ESL teacher, primary, ESL classroom**

I. INTRODUCTION

The utilisation of digital technologies is an omnipresent circumstance in the increasingly digitised world today and has become a necessity in all facets of life. According to Juanda et al. (2021), technology has placed new challenges for teachers, including ways to formulate technological knowledge, its integration with the syllabus and incorporate together with the suitable teaching strategies to meet the learner's need. A teacher who is extensively recognised as the primary leading force in education must continuously evaluate their competence level and knowledge to ascertain the effectiveness of technology integration in teaching practices. It is expected that teachers will have the skill to utilise technology to offer a conducive environment with

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appropriate instructional techniques to facilitate students in their learning (Cetin & Erdogan, 2018).

In this case, the TPACK construct introduced by Mishra and Koehler (2006) has been regarded as the essential tool for grasping at how teachers can conduct lesson delivery via technology incorporation. To clarify this, TPACK is recognised as knowledge that is used efficiently and effectively in utilisation of automation to enhance the standard of lesson delivery, which is from planning to evaluating the teaching process (Ozudogru & Ozudogru, 2019). However, it is unclear which domains among the seven domains in the TPACK framework affected the non-optionist ESL primary school teachers' TPACK level the most in their ESL teaching. Thus, this study is substantial in the sense that it deals with the specific context which is focusing on the TPACK level of non-optionist ESL primary teachers and the age factors in order to supply an in-depth awareness in Malaysian education.

English language teachers who are not driven will have an unfavourable impact on student performance despite all attempts to boost educational growth (Singh & Yunus, 2021). In this context, technological integration in schools requires the skills of competent ESL teachers so that Malaysia's educational development could be in step with the present development of Information and Communication Technology (ICT) as teaching techniques have evolved from conventional teacher-centred to student-centred (Singh & Yunus, 2021). For this reason, this study was conducted to investigate non-optionist ESL teachers' TPACK competence in order to understand how well they are able to integrate technology in ESL classrooms and likewise with the age factors.

II. PROBLEM STATEMENT

Technology has become essential and a foreseen necessity in lieu of additional benefits to the teaching practices as it obviously boosts up the productivity and efficiency of teaching (Boonsue, 2021). Consequently, the efficient use of technology in educational practises today is dependent on teachers' understanding of how to assist students in their learning. The TPACK construct (Mishra & Koehler, 2006) has been viewed as a critical tool for teachers to implement machinery in teaching practices. Although numerous studies conducted on teachers' TPACK in specific subjects, there is still a lack in the ESL context. As a result, the need for research into ESL teachers' TPACK competence in Malaysia has been established. Therefore, this study aimed to fill the gap, focusing specifically on non-optionist primary ESL teachers TPACK competence in relation to age factor. The paper looked into

the following questions:

1) How do the primary school non-optionist ESL teachers perceive their TPACK competence in primary ESL classroom?

2) Are there any significant differences between primary school non-optionist ESL teachers TPACK competence in Malaysian primary ESL classrooms according to their age?

III. LITERATURE REVIEW

Integration of ICT in ESL Teaching and Learning

Educators should be adequately knowledgeable at all times in ICT integration as they play the fundamental part in developing and customising the technology-based teaching and learning atmosphere to accomplish the students' needs. Within this context, teachers as the main driving force in education, particularly English teachers should be skillful in technology realization in schooling and show their competency in seven domains of the TPACK framework. English language is a widely known and a crucial global linguistic practice throughout the world, which serves as an important bridge to unite different people from each country (Nishanthi, 2018). Thus, ESL teachers are the utmost important individual to ensure they adopt the latest teaching approaches to help the learners acquire English language effectively in order to ensure the succeeding outcomes of technology-based English language teaching (Najjari et al., 2021).

English language teachers play an important role by providing learners with a highly immersive language learning environment to ensure the learning process is as effective as possible. Kepol (2017) considered that English teachers ought to possess the pertinent official qualifications in English domain, in particular Teaching of English as Second Language (TESL). Large numbers of non-English optioned teachers in Malaysian schools have been assigned to instruct the language owing to a scarcity of qualified English language teachers. In this case, redeploying of English-optioned teachers are suggested to help to sort out the issue because at the very least, being an English-optioned would ensure that teachers possess the relevant content knowledge of the language that is essential in language teaching. Besides, Abdullah (2019) proposed that the teaching practices of non-optionists be shaped by their experiential knowledge and experience as specific language learners. Hence, there is a necessity to have a large number of courses and training programmes emerged to coach teachers in the application of the new curriculum in order to enhance both non-optionist and optionist teachers' competence levels of (MOE, 2014).

TPACK Construct

The TPACK construct as shown in Figure 1 is composed of seven knowledge bases which coined three main elements which are Technological Knowledge (TK), Pedagogical Knowledge (PK) and Content Knowledge (CK). Other subcomponents include the interchange and a consolidation of the three cores of knowledge, namely Technological Pedagogical Knowledge (TPK), Technological Content Knowledge (TCK), Pedagogical Content Knowledge (PCK) and Technological Pedagogical Content Knowledge (TPACK).
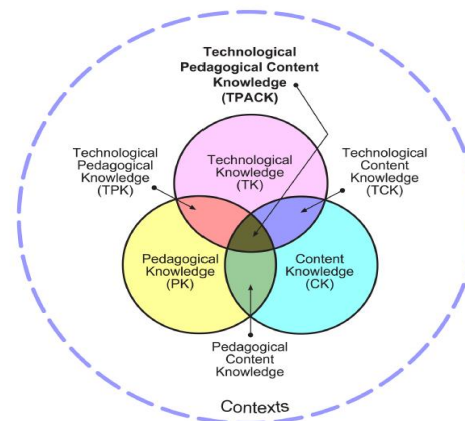

Figure 1. The TPACK Construct and the Knowledge Constituent (Koehler & Mishra, 2006)

Further explanation of the knowledge bases of TPACK are as below: (Mishra & Koehler, 2006; Mai & Hamzah, 2016; Zainal, 2016)

1. Technological Knowledge (TK): expertise in using all sorts of technological tools such as computers, interactive whiteboard, internet, digital videos, etc.

2. Pedagogical Knowledge (PK): knowledge of teaching and learning methods and the knowledge of classroom management, lesson planning and implementation, and student assessment.

3. Content Knowledge (CK): ability to learn and teach a subject.

4. Technological Pedagogical Knowledge (TPK): knowledge of technology used in teaching whereby teachers' teaching method and practices could change by using technology.

5. Technological Content Knowledge (TCK): knowledge of using technology in creating new presentations of specific content for a subject.

6. Pedagogical Content Knowledge (PCK): description of instruction methods through a subject, which combines both knowledge and pedagogy to produce better teaching experiences in the content.

7. Technological Pedagogical Content Knowledge (TPACK): knowledge of using technology in delivering teaching methods for a subject content by understanding the interactions between the three core components of knowledge.

TPACK Competence Level

The skills of teachers with regard to technological integration are the subject of intense debate. A growing body of literature investigates teachers' TPACK through self-report surveys focused exclusively on the subjects they taught, relationship between TPACK with teachers' demographic profile and the validated instruments used in evaluating teachers' level of TPACK. A research by

Mourlam et al. (2021) suggested that in-service teachers' competence in the United States reduced on five of the seven domains of TPACK after transitioning their teaching practices to remote instruction which pointed out that teachers' teaching context may have been a factor clouting their competence. A prior study by Ali and Ozden (2021) also detected that Turkey's preschool teacher's TK influenced PK more than TCK. Their findings also demonstrated that teacher's TPK and TCK affected their TPACK in a positive way (Gozum & Demir, 2021). In addition, a case study was performed with secondary school teachers in Bangladesh likewise showed that the teachers had a fundamental understanding of technology but failed to implement it effectively in teaching English (Rouf & Mohamed, 2018). Besides, a research executed by Boonsue (2021) showed that Chiang Mai teachers achieved a low level of technological based knowledge in seven domains of TPACK, which mainly due to the fact that teachers are not able to expand their technology knowledge as technology development is progressing continuously.

Similarly, in Malaysia context, a few studies to assess teachers' level of TPACK have been conducted. Research has been done to examine Science teachers' view on their TPACK where the results showed that they perceive higher self-assurance in pedagogical and content knowledge compared to those in technology fields (Mai & Hamzah, 2016). Moreover, a similar study focused on science teachers' TPACK level performed by Chieng and Tan (2021) which considered that secondary science teachers have strong expectations of their comprehension of TPACK constructs and stated that science teachers' technological-based ability is lower in comparison with pedagogical and content ability. Their results also indicated that technological knowledge has contributed to the integration of ICT in teaching. Another study implemented by Zulkurnain et al. (2021) to determine the level of TPACK among national secondary school teachers in Kuala Lumpur in which their findings demonstrated that secondary school teachers' level of TPACK is at a moderately high level. Their results also have proven that CK and PK were the highest likewise the combination of both sub-dimensions, PCK as compared to other technologies-based knowledge.

The growing need for online education and the lack of investigation available to determine the teacher's TPACK competence in the implementation of lessons garnered massive attention. In Malaysia, there are fewer studies; both in and out of ESL teaching have attempted to develop a TPACK instrument to assess the competencies of teachers in technology integration. This emphasizes the need to pursue research on TPACK competencies in the Malaysian educational context. There has also been lack of study in Malaysian primary ESL classroom context, especially among the non-optionist English teachers. As such, the aim of this research is to fill this gap by conducting a survey on non-optionist ESL teachers TPACK competence through a self-assessment instrument.

TPACK Competence in Relation with Demographic Factors

Apart from understanding teachers' level of TPACK competence, researchers should have an in-depth insight on the factors and the context that may affect the results of the teacher's TPACK level. Previous research examined teachers' perceptions of TPACK in regards to various demographic factors (Bas & Senturk, 2018). The study found that teachers' TPACK competency was impacted by their teaching level, occupational experience, gender and educational level. Furthermore, various researches regarding PK, CK and TK highlight how the gender affect TPACK. According to certain research, men have a higher level of TK than females (Koppi et al., 2010; Lasen, 2010).

Research in the field of language teaching highlighted the connection between the TPACK of language teachers and their educational beliefs or attitudes (Kozikoglu & Babacan, 2019). They concluded that the level of TPACK of English teachers in Turkey was high, and that experience in teaching does not make any difference in the TPACK levels among teachers. Besides, Van Loi's (2021) research likewise examined the specific elements that affected teachers' TPACK competencies in Vietnam. The result has proven that teachers' technology use frequency had significantly changed their TPACK level, but no notable disparities in their TPACK were detected based on teaching experience, digital training and gender. In Malaysia context, a study by Mai and Hamzah (2016) showed that the TPACK confidence of science teachers did not differ by gender or age. To that end, the researcher studied the influence of teachers' age on their TPACK competence in ESL teaching to fill the gap in Malaysia ESL context.

IV.   METHOD

Research Design

This study utilised a quantitative data collection method by using a survey design. The population of this study is primary school non-optionist ESL teachers who teach English subject. A web-based survey questionnaire was sent to primary school teachers in Malaysia with a total n=50.

Participants

The research respondents are non-optionist ESL teachers who teach English in primary school in all states of Malaysia in the academic year of 2021. Table 1 shows the demographic profile for the participants.

TABLE I: DEMOGRAPHIC PROFILE OF RESEARCH PARTICIPANTS

Construct	Category	Frequency	Percentage
Gender	Male	2	4%
	Female	48	96%

Age	<25	15	30%
	26 - 30	7	14%
	31 - 35	9	18%
	36 - 40	7	14%
	>41	12	24%
Seniority	1 - 5 years	32	64%
	6 - 10 years	10	20%
	11 - 20 years	8	16%
	> 20 years	0	0%
Location of School	Urban	20	40%
	Suburban	19	38%
	Rural areas	11	22%
State	Selangor	11	22%
	Johor	9	18%
	Perak	9	18%
	Kedah	6	12%
	Sarawak	5	10%
	Penang	4	8%
	Malacca	2	4%
	Kelantan	2	4%
	Terengganu	1	2%
	Perlis	1	2%

Instruments

In order to identify teachers' TPACK competence, the instrument was developed based on the literature review and previous TPACK research. The TPACK instruments developed by Onal (2016) and Su et al. (2017) were modified, which then transferred into a web-based questionnaire. On a five-point Likert scale, it contains 36 items regarding TPACK. All the 36 items on the TPACK model in the form of questionnaire are divided into seven components (TK, PK, CK, TPK, TCK, PCK and TPACK). Each component consists of five items except for the TPACK component which consists of six items. The five-point Likert scale started from 'strongly disagree' (1 point), 'disagree' (2 points), 'neither agree nor disagree' (3 points), 'agree' (4 points) and 'strongly agree' (5 points). The instrument was checked and validated by the experts from both optionist and non-optionist teachers. Furthermore, the demographic data was used in the questionnaire (gender; age; teaching experiences; state and location of school).

Data Collection and Data Analysis

Snowball sampling was used to collect data over the course of a month. The researchers used google form as a data collection platform. Once the web-based instrument was generated, a link was sent to primary school teachers in Malaysia. The questionnaire started with the participants' consent statements and continued with teachers' demographic profiles. The second section in the questionnaire consists of seven TPACK constructs, namely TK, PK, CK, TPK, TCK, PCK and TPACK. Each component consists of five items except for the TPACK component which consists of six items. After gathering the data from the respondents, the researcher obtained information on the TPACK competency for non-optionist ESL teachers. The collected data was analysed using both descriptive statistics and ANOVA tests to compare the competence level of TPACK of primary non-optionist ESL teachers with the age factor.

V. FINDINGS

A. Non-Optionist Primary ESL Teachers TPACK Competence Level

This section showed the findings to answer the research questions on primary school non-optionist ESL teachers TPACK competence level and the differences between primary school non-optionist ESL teachers TPACK competence in Malaysian primary ESL classroom according to their age.

TABLE II: LEVEL OF TPACK OF PRIMARY NON-OPTIONIST ESL TEACHERS (N=50)

Constructs	Mean	S. D
TK	4.17	0.833
PK	3.90	0.760
CK	3.51	0.939
PCK	3.70	0.806
TPK	3.98	0.779
TCK	3.94	0.762
TPACK	3.77	0.855
Overall (TPACK)	3.85	0.845

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

From the table, it revealed that all the technological-based knowledge components had higher scores. The component of the survey with the highest score was TK (M = 4.17, SD = 0.833), followed by TPK (M = 3.98, SD = 0.779) and TCK (M = 3.94, SD = 0.762) components, both obtaining the second and third higher score perceived by non-optionist ESL teacher. The PK component had a higher score too (M = 3.90, SD = 0,760). Upon the components of the survey were analysed, it was

determined that CK had the lowest score (M = 3.51, SD = 0.939). The components such as PCK (M = 3.70, SD = 0.806) and TPACK (M = 3.77, SD = 0.855) had lower scores as compared to the other components.

B. *TPACK Competence in Relation with Age Factor*

The second research question was to identify the difference of TPACK construct in relation with the age factor. From the table, statistically significant differences in technology-based components among the teachers' TPACK were observed. The teachers differ in their TPACK, with those between 36 to 40 years old and above 40 years old tended to be less confident than the other groups (p<0.05).

TABLE III: COMPARISON OF TEACHERS' TPACK BASED ON AGE GROUP

	Source of Variation	SS	df	MS	F	P-value
MEAN TK	Between Groups	4.813	4	1.203	2.213	0.083
	Within Groups	24.468	45	0.544		
MEAN PK	Between Groups	3.197	4	0.799	1.782	0.149
	Within Groups	20.183	45	0.449		
MEAN CK	Between Groups	2.158	4	0.540	0.818	0.521
	Within Groups	29.694	45	0.660		
MEAN PCK	Between Groups	1.881	4	0.470	1.166	0.338
	Within Groups	18.139	45	0.403		
MEAN TPK	Between Groups	4.728	4	1.182	2.633	0.046
	Within Groups	20.203	45	0.449		
MEAN TCK	Between Groups	2.545	4	0.636	1.319	0.277
	Within Groups	21.698	45	0.482		
MEAN TPACK	Between Groups	6.314	4	1.578	3.661	0.012
	Within Groups	19.402	45	0.431		

P<0.05

VI.   DISCUSSION

From the results, it proves that the primary non-optionist ESL teachers in Malaysia have a high level of technological knowledge as well as a combination of its components, namely TPK and TCK, as compared to findings for CK, PK, PCK and TPACK which was moderately low. The conclusions of this study were challenged by the findings of Zulkurnain et al. (2021), who demonstrated that secondary school teachers in Kuala Lumpur have the lowest degree of technological-based expertise; and findings from the research performed with secondary school Science teachers in Sarawak by Chieng and Tan (2021), identified that the content knowledge and pedagogical knowledge were at a high level, as well as the pedagogical content knowledge.

Taking the derived values from each component into account, it can be deduced that the overall TPACK level (M = 3.85, SD = 0.845) for non-optionist ESL primary teachers was moderately high but still can be improved to implement technology in teaching English effectively. The case study by Rouf and Mohamed (2018) with secondary school teachers proved this where teachers could be competent in technological knowledge but insufficient in implementing technology in teaching English. This study contradicted the findings of Bas and Senturk (2018), who found that all TPACK components of teachers were moderate, with the lowest level falling on the TCK sub-dimension.

Furthermore, this research has pointed out that non-optionist teachers lack content knowledge and pedagogical content knowledge. This result may be due to non-optionist teachers who are not under their professional field and are not exposed to the content of the subject taught. This has been supported by the study by Kepol (2017) to have teachers in related fields from the relevant formal qualifications such as TESL to teach English. The result of this study for having lower scores among non-optionist teachers in pedagogical content knowledge component had shown that the English-optioned teachers are important to make sure that teachers possess relevant English knowledge, similar to the study by Grossman et al. (2005).

A study by Abdullah (2019) also pointed out that pedagogical aspect is the most concerning among the non-optionist Polytechnic English Language Lectures. It is suggested that primary school teachers can put more effort into non-optionist teachers to be experienced with the CK and PCK in primary ESL classrooms. Therefore, a future study is necessary to create professional development programs to foster CK and PCK of primary non-optionist teachers. It is also suggested to have English-optioned teachers to teach in primary ESL classrooms.

On the other hand, teachers who used technology more often tended to perceive technological-based knowledge at a higher level. This may be due to the fact that many teachers are unable to keep their pace in developing their technological knowledge which is progressing constantly with the pace of technology development (Boonsue, 2021). Undoubtedly, teachers could not integrate technology effectively in their teaching. Therefore, the results show that the respondents varied in the perceived abilities in TPK and TPACK as pointed out previously. The result is in contrast with the study by Mai and Hamzah (2016) which was conducted among science teachers and showed that teachers' TPACK confidence didn't differ based on their age.

In short, demographic variables (age) do not make much difference in other TPACK components, except the frequent use of technology as similarly pointed out in a previous study in Vietnam (Van Loi, 2021). As shown in the current study, the evidence that the respondents differ in the TK, TPK and TPACK components with regards to their age, which influence the frequency use of technology brings the importance of technology deployment in teachers' change in their TPACK perception and competence (Rouf & Mohamed, 2018). It is suggested that primary school teachers can put more effort into TK for senior teachers to be experienced with educational technology and computer technology in primary schools. Therefore, a future study is necessary to create professional development programs to foster technology-related content among primary school senior teachers.

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

In conclusion, the findings of this study have revealed that Malaysian non-optionist ESL primary school teachers perceived that they are moderately highly competent in TPACK. However, there is still some room for improvement of the non-optionist teachers in advancing the content knowledge of the subject taught. It is proposed that English-optioned teachers play a vital role in guiding the non-optionist ESL teacher in ESL teaching, whereas their CK and PK is eligible to provide students with better learning experience which is the main concern faced by non-optionist teachers. The results also showed that teachers' age did show some influence on the components of TPACK but the most significant factor which influences the TPACK constructs is the frequency use of technology in classroom instruction. In this regard, teachers' technology-based knowledge varied due to utilisation of technology relative to their age.

With the intention of improving the competency of non-optionist ESL teacher to integrate ICT in their technology-based teaching, teachers are urged to ceaselessly seek, expand and widen their knowledge, particularly those link to the content and technology component, for instance, participating in professional trainings and workshops or via self-directed learning. Within this context, the content knowledge (CK) and technology knowledge (TK) should be prioritised by the stakeholders considering that the expeditious advancement of technology leads to new challenges and skills. Stakeholders should look into the issues of having non-optionist in teaching English and their competency of content knowledge (CK) always up to par.

The results of this study were gathered with self-reported data, allowing the legal self-assessment to misrepresent the results. Conversely, the research involved a solely number of non-optionist ESL teachers. It is therefore recommended to generalise the results to other populations and fields which should be conducted cautiously. Future research is necessary to evaluate at the broader range of elements affecting TPACK competency which includes gender, teachers' belief, efficacy and attitudes towards technology in different aspects that might differ their perception and thus the findings. The outcomes of this study may be used as a reference to develop the TPACK model of English language in Malaysia.

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