MATHEMATICS TEACHER'S SELF-EFFICACY OF TECHNOLOGY INTEGRATION AND TECHNOLOGICAL PEDAGOGICAL CONTENT KNOWLEDGE

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Abstract

This study conducted to determine the mathematics teacher's self-efficacy of technology integration and Technological Pedagogical Content Knowledge (TPACK) based on gender and teaching experience. In this research, 66 mathematics teachers from national secondary schools were chosen as the samples to answer a survey questionnaire containing 71 items with a five-point Likert scale. Descriptive statistics, such as mean, percentage, and standard deviation, were employed to analyze the data. T-test was used to gauge the mathematics teacher's self-efficacy of technology integration and TPACK based on gender, and one-way ANOVA was employed to determine mathematics teacher's self-efficacy of technology integration and TPACK based on teaching experience. Besides, Pearson's correlation coefficient was used to determine the relationship between the mathematics teacher's self-efficacy of technology integration and TPACK. The findings showed no significant difference between genders and the teaching experience of the mathematics teacher's self-efficacy and TPACK. However, mathematics teacher's self-efficacy of technology integration and TPACK were strongly associated. In conclusion, whether male or female, for as long as mathematics teachers had been working, they have a positive self-efficacy in initiating technology integration and introducing TPACK. The implication was gender and teaching experience were not a critical factor for mathematics teacher's self-efficacy of technology integration and TPACK. For future research related to this study, it could introduce other factors, such as academic qualification and technology courses they had attended.

Keywords: Self-efficacy, Technology integration, Technological Pedagogical Content Knowledge, Mathematics teacher

Abstrak

Penelitian ini dilakukan untuk menentukan efikasi diri guru matematika dalam mengintegrasi teknologi dan *Technological Pedagogical Content Knowledge* (TPACK) berdasarkan jenis kelamin dan pengalaman mengajar. Dalam penelitian ini, 66 guru matematika dari sekolah menengah negeri dipilih sebagai sampel untuk menjawab kuesioner yang berisi 71 pertanyaan menggunakan skala Likert dengan lima pilihan. Statistik deskriptif, seperti rata-rata, persentase, dan standar deviasi, digunakan untuk menganalisis data. T-test digunakan untuk mengukur efikasi diri guru matematika dalam mengintegrasi teknologi dan TPACK berdasarkan jenis kelamin, dan ANOVA satu jalur digunakan untuk menentukan efikasi diri guru matematika dalam mengintegrasi teknologi dan TPACK berdasarkan pengalaman mengajar. Selain itu, koefisien korelasi Pearson digunakan untuk menentukan hubungan antara efikasi diri guru matematika dalam mengintegrasi teknologi dan TPACK. Temuan dalam penelitian ini menunjukkan bahwa tidak ada perbedaan yang signifikan antara jenis kelamin dan pengalaman mengajar dari efikasi diri guru matematika dan TPACK. Namun, efikasi diri guru matematika dalam mengintegrasi teknologi dan TPACK sangat terkait. Kesimpulannya, baik pria maupun wanita, selama guru matematika bekerja, mereka memiliki efikasi diri yang positif dalam memulai integrasi teknologi dan memperkenalkan TPACK. Implikasinya adalah jenis kelamin dan pengalaman mengajar bukan faktor utama dalam mempengaruhi efikasi diri guru matematika dalam mengintegrasi teknologi dan TPACK. Untuk penelitian selanjutnya yang terkait dengan penelitian ini, penelitiannya bisa memperkenalkan faktor-faktor lain, seperti kualifikasi akademik dan sejumlah kursus teknologi yang telah mereka ikuti.

Kata kunci: Efikasi diri, Integrasi teknologi, *Technological Pedagogical Content Knowledge*, Guru Matematika

Technology development in this 21st century has been the most challenging factor in our education

system affected by globalization, liberation, and international development (Halili & Suguneswary, 2016; Mbodila, Jones, & Muhandji, 2013; Meenakshi, 2013; Andini, Budiyono, & Fitriana, 2018). The education system is also aware of the importance of technology to build a generation that will be more knowledgeable in the future. Therefore, technology integration in teaching and learning becomes a focus that has been implemented by most teachers nowadays in any subject. Technology integration referred to as the use of technology to support objectives and engage students with meaningful learning (Dias, 1999; Muhtadi et al., 2018). Systematic technology integration can be implemented earlier in a teacher training program as a preparation for all teachers (Baran, Bilici, Sari, & Tondeur, 2019). It is because technology integration will make education the key to complete the knowledge of both teachers and students. According to Forgasz (2006), technology influences the mathematics that had been taught and increases the students learning. Therefore, technology integration is essential in the education system including in mathematics teaching and learning.

For mathematics education, the growth of technology has tended to occur in parallel (Fujita, 2018; Kaput & Thompson, 1994), and it has challenged the way teachers coordinated technology to enhance students' learning (Drijvers et al., 2010). Teachers and students have to face various challenges when teaching and learning mathematics (Zakaria & Iksan, 2009). Besides, the interaction among researchers, the development of technology, and the nature of mathematics learning are complex (Fujita, 2018; Kaput & Thompson, 1994; Muhtadi et al., 2018). To successfully achieve integration in mathematics teaching and learning and the desired objective, teachers need to have a positive attitude towards the implementation. Therefore, if they had a positive perception toward the advantage of using technology, it will increase their self-efficacy, and hence they will integrated technology in teaching and learning (Govender & Govender, 2009).

Underpinning Theory and Framework

In this research, two theories underpin the framework, namely Self-efficacy theory and Technological Pedagogical Content Knowledge (TPACK). Self-efficacy theory is relevant in a few domains of study, such as educational, psychological, and subject-oriented (Schukajlow et al., 2012). Self-efficacy theory was firstly explained in social cognitive structure by Bandura (1977), and refers to individual behaviors based on their ability and expected outcomes. Most researchers have reported that teachers believed their self-efficacy could affect their instructional effectiveness and the orientation of learning processes (Bandura, 1994; Tschannen-Moran, Hoy, & Hoy, 1998; Usher & Pajares, 2008). Therefore, when referring to teachers, the self-efficacy theory should be understood as a multi-dimensional concept and a unique situation to handle (Henson, 2001). Through this self-efficacy, a lot of effort should be made by teachers in their teaching and learning sessions. Teachers also will be able to address any issues they face (Majzub & Yusuf, 1991). This self-efficacy will enhance teachers' performance and influence their teaching environments (Philippou & Christou, 1998). Therefore, Tschannen-Moran, Hoy, and Hoy (1998) have developed a Teacher Self-Efficacy Model that uses all

self-efficacy sources to explain the self-efficacy theory by Bandura (1977). Those sources that will help to increase teacher's self-efficacy are "mastery learning experiences, vicarious experiences, social persuasion, and physiological and emotional states" (Gavora, 2010). All the sources are cognitive sources that teachers can use to build their self-efficacy by analyzing their teaching and learning situations and their competency.

Besides analyzing their pedagogical situation and their competency, the knowledge of the teachers in any subject they teach is also critical. The knowledge that the teachers should have is content and pedagogical knowledge for any teaching and learning purpose. However, for teaching and learning that involves technology integration, the teachers should blend content, pedagogical, and technological knowledge and interaction among all of the knowledge. Therefore, the TPACK framework has chosen as it was a type of teacher knowledge that needs when integrating technology (Dias & Ertmer, 2013; Loong, 2014). Earlier, the Pedagogical Content Knowledge (PCK) acquired by expanding Content Knowledge (CK) and Pedagogical Knowledge (PK) (Shulman, 1986, 1987). The TPACK framework (Koehler & Mishra, 2009; Mishra & Koehler, 2006) was built by expanding Pedagogical Content Knowledge (PCK) and Technological Knowledge (TK) for teaching. Therefore, to develop the TPACK framework, two more constructs, such as Technological Content Knowledge (TCK) and Technological Pedagogical Knowledge (TPK), are expanded together. It means there are seven constructs together in the TPACK framework.

This TPACK framework can be used to guide teachers in their teaching and learning and to explore anything regarding the use of technology, including pedagogy and content (Talib, Yassin, Nasir, & Bunyamin, 2016). In mathematics learning, pedagogical knowledge and belief were some of the factors related to the use of technology (Goos & Bennison, 2008). Therefore, this TPACK framework explains how teachers can integrate technology with pedagogy and content knowledge to achieve effective teaching and learning based on technology. It also becomes a foundation of technology that puts the fun in teaching and learning (Naziri, Rasul, & Affandi, 2019). TPACK is evidence of how teachers can engage the function of technology based on their teaching and learning (Özgün-koca, Meagher, & Edwards, 2009). Hence, the TPACK framework explains the definition of technology integration and expertise needed to achieve the desired objective (Zelkowski, Gleason, Cox, & Bismarck, 2013). Besides, TPACK also viewed as a trait and ability of teachers that have not been directly observed (Cavanagh & Koehler, 2013). Therefore, the teacher's TPACK is not the same as specific knowledge (Cueto, León, Sorto, & Miranda, 2017). Concerning that, some researchers have attempted to determine how self-efficacy and TPACK related according to the seven sub-constructs as one of the ways to measure teachers' self-efficacy was via TPACK (Banas & York, 2014). According to Abbitt (2011), to lead a better self-efficacy, teachers need to improve particular knowledge of technology (TPK, TCK, and TPCK). Overall, the studies show that teachers do have self-efficacy and TPACK to integrate technology in teaching and learning (Kazu & Erten, 2014).

The Connection between Self-Efficacy and TPACK

Both theory and framework are related to each other in developing teachers who use innovative approaches and technology resources that have more effectively in teaching and learning (Higgins, 2003). Figure 1 shows the connection between the teacher's self-efficacy model and the TPACK framework.
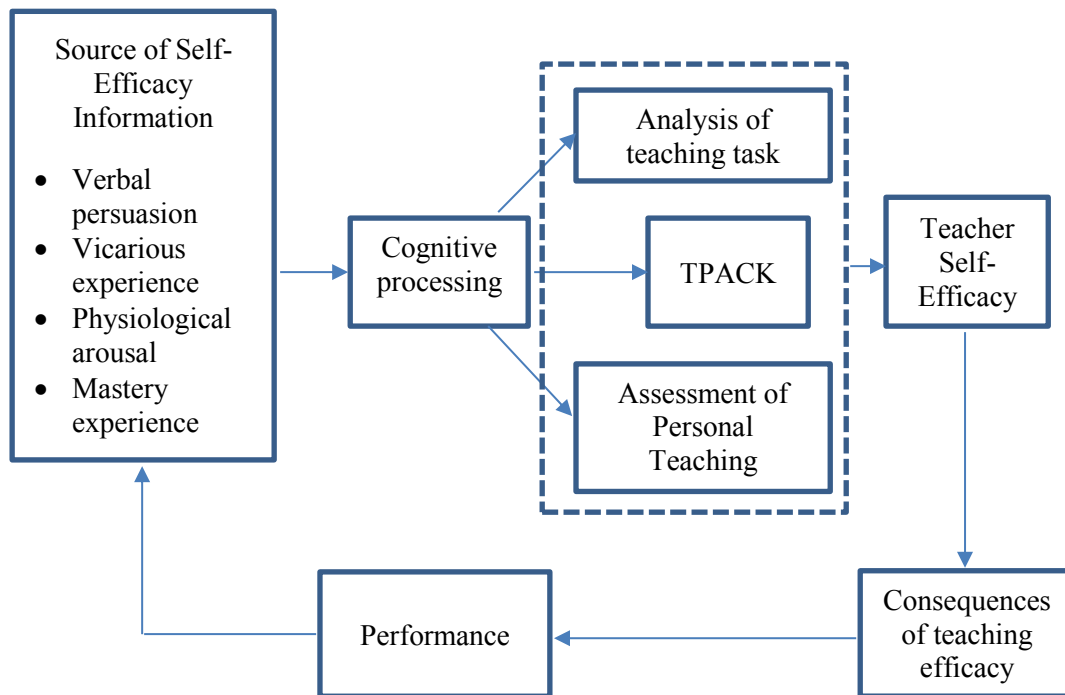

Figure 1 Connection between Teacher's Self-Efficacy Model and TPACK Framework

The most important thing for teachers to build their self-efficacy is cognitive processing that is influenced by the source of self-efficacy. The cognitive processing happens through the analysis of the teaching task and assessment of personal teaching experience. These are where TPACK was most relevant to be combined. Both process analysis of teaching tasks and evaluation of personal teaching experience need teachers to relate available resources with their capabilities. According to Tschannen-Moran et al. (1998), teachers' abilities refer to their skills, knowledge, strategies, or personality traits that balance with their weaknesses or liabilities. Therefore, TPACK is relevant to their capabilities that relate to teachers' knowledge. It was suitable to use according to the resources available that facilitate the learning process. Besides, one of the most significant advantages of TPACK is that it usually provides data regarding teacher's self-efficacy, belief, and attitude in teaching and learning (Baran et al., 2019). The analysis often includes some aspects of teaching and learning, such as technology integration based on teacher's self-efficacy and knowledge. Therefore, there is a connection between both theory and framework, and it is vital to monitor the growth of the teacher's self-efficacy in using technology based on TPACK (Zelkowski et al., 2013).

Meanwhile, in mathematics education, teachers in Saudi Arabia demonstrated high self-efficacy and TPACK because they mastered technology, pedagogy, and content knowledge (Alshehri, 2012).

Therefore, the outcome indicates that all depends on the teacher's attitude when it comes to self-efficacy issues. For mathematics teachers, if it is just their perception and not attitude, it will not assist them in teaching and learning (Nordin, Zakaria, Mohamed, & Embi, 2010). However, their perspective will determine what and how they will teach something, including technology integration. It is because the level of self-efficacy and TPACK depends on the individual's reactions towards technology (Abbitt, 2011). However, a few personal factors are typically used to confirm the level of self-efficacy and TPACK, such as gender and teaching experience. Both factors usually give a different perception of their ability to do something, including integrating technology.

In terms of gender, most researchers show that there is no significant difference between males and females (Adalier, 2012; Gulten, Yaman, Deringol, & Ozsari, 2011; Keser, Yilmaz, & Yılmaz, 2015; Sang, Valcke, Braak, & Tondeur, 2010). However, there is a possibility of gender being dominant in the self-efficacy of technology integration. It is in contrast with teaching experience as it is statistically different when referring to the self-efficacy of technology integration (Hsu, Tsai, Chang, & Liang, 2017). Buabeng-Andoh (2012) found no significant difference in self-efficacy of technology integration based on teaching experience. Hence, this paper determines the mathematics teacher's self-efficacy and TPACK based on gender and teaching experience. Furthermore, this study also shows the mathematics teacher's self-efficacy of technology integration with TPACK and all sub-constructs.

Focus of Research

This study focuses on mathematics teacher's self-efficacy of technology integration and TPACK. The discussion is necessary because teacher's self-efficacy of technology integration plays a vital role in the teaching and learning process (Bilici, Yamak, Kavak, & Guzey, 2013). The TPACK is an interconnection of three aspects of basic knowledge (technology, pedagogy, and content) that teachers are required to master before integrating technology in teaching and learning, as proposed by the TPACK framework (Mishra & Koehler, 2006). There are seven sub-constructs in the TPACK framework: TK, CK, PK, PCK, TCK, TPK, and TPACK.

These seven sub-constructs commonly used when researchers attempt to determine TPACK. Some researchers usually verify the relationship between self-efficacy and TPACK according to the seven sub-constructs (Kazu & Erten, 2014). Thus, self-efficacy is a factor that is generally discussed with TPACK when teachers integrate technology in teaching and learning (Abbitt, 2011; Alshehri, 2012; Kazu & Erten, 2014; Keser et al., 2015; Sahin, Celik, Akturk, & Aydin, 2013). As such, this study determines the mathematics teacher's self-efficacy of technology integration and the knowledge of mathematics teachers for technology integration from TPACK with its seven sub-constructs.

Technology integration in teaching and learning requires teachers to prepare before the classroom implementation (Saadati, Tarmizi, & Ayub, 2014; Oktaviyanthi & Supriani, 2015). However, the mathematics teacher is not well equipped to integrate technology in teaching and learning because of the lack of TPACK (Bowers & Stephens, 2011). It is because mathematics teachers only master the

basic knowledge of using technology (Kim, 2018). Besides, the mathematics teacher with a lack of TPACK may have low-level self-efficacy of technology integration (Zelkowski et al., 2013). Such teachers usually will have a lower probability of meeting the learning needs of the students (Unsal, Korkmaz, & Percin, 2016). Therefore, mathematics teachers are pleased when they need to integrate technology in teaching and learning, especially when they have low self-efficacy. Meanwhile, teachers with low self-efficacy usually try to avoid using technology because they do not believe in their abilities (Tezci, 2011). Therefore, this will affect their willingness to integrate technology in teaching and learning (Lailiyah & Cahyono, 2017; Walker & Shepard, 2011).

The teachers might fail to achieve expected results, no matter how much they have mastered the field if their self-efficacy level is low (Unsal et al., 2016). It is in contrast to those teachers with high self-efficacy. Mathematics teachers need to have a positive attitude or self-efficacy to make sure of the success of technology integration. The positive self-efficacy will lead the teachers to a higher level of confidence and be more determined when they have to face any obstacle in what they do, including technology integration (Yau, Cheng, & Ho, 2015). Therefore, it is crucial to measure mathematics teacher's self-efficacy of technology integration and knowledge of technology integration through TPACK. These are where mathematics teachers would lead to the betterment of using technology when they applied their knowledge through TPACK with positive self-efficacy. Hence, the first objective of this study is to determine the mathematics teacher's self-efficacy of technology integration and TPACK based on gender and teaching experience. The second objective is to determine the relationship between the mathematics teacher's self-efficacy of technology integration with TPACK and all sub-constructs. Although the previous study was already done by Zelkowski et al. (2013) on mathematics teacher's self-efficacy of technology integration and TPACK, this study will also focus on two individual factors, gender, and teaching experience.

METHOD

The sample of this study was mathematics teachers from national secondary schools in a district, Port Dickson, Negeri Sembilan, Malaysia. National secondary schools were referring to one kind of government schools in Malaysia. The random sampling method was used to make sure all national secondary mathematics teachers had an equal chance to be selected. The population of mathematics teachers from all national secondary schools in that district was 82. All of these schools had equipped with technological facilities and tools (Irfan Naufal & Amat Sazali, 2015). According to Krejcie and Morgan (1970), the number of the sample should be between 80% to 90% of the total population. Therefore, the researcher distributed seven sets of a survey questionnaire to each of 10 different national secondary schools. However, the researcher only got back 66 sets of the survey, which was about 94.29% feedback.

The survey questionnaire contained 71 questions and used a five-point Likert scale ranging from 'highly disagree' to 'highly agree.' The questions divided into three parts, namely demographics,

mathematics teacher's self-efficacy of technology integration, and mathematics teacher's knowledge of technology integration. The questions about mathematics teacher's self-efficacy of technology integration adapted from the combination of Mathematics Teaching Efficacy Belief Instrument (MTEBI) (Enochs, Smith, & Huinker, 2000) and Computer Technology Integration Instrument (CTI) (Wang, Ertmer, & Newby, 2004). The MTEBI has two constructs that are Personal Mathematics Teaching Efficacy (PMTE) and Mathematics Teaching Outcome Expectancy (MTOE), while for the mathematics teacher's knowledge of technology integration, the questions adapted from the TPACK Instrument (Alshehri, 2012). The TPACK has seven sub-constructs (as mentioned in the focus of research), which were TK, CK, PK, PCK, TCK, TPK, and TPACK.

Before the survey questionnaire was distributed, face and construct validity were tested by an expert to make sure the questionnaire would achieve the intended objective and be suitable for sample culture. Besides, back-translation (Brislin, 1970) into Malay done to make sure the participants fully understood the questionnaire. The first translator translated the original questionnaire in English into the Malay language. Once completed, the Malay questionnaire was back-translated into English by the second translator who did not see the initial questionnaire in English.

The survey questionnaire was distributed randomly in mid-April 2019 to 70 secondary school mathematics teachers. The survey was distributed by hand to the selected participants. The participants were given a week to complete answering the survey questionnaire before the researcher collected them back. However, only 66 of the 70 were returned to the researcher, showing a 94.29% return rate.

The cleaning process of data done after the questionnaires were received back, and the data keyed in for analysis. Then, the missing value replaced with a series of means using SPSS. However, there was no missing value for this data. Firstly, the reliability of the questionnaire was analyzed. Table 1 shows the reliability of the original and current studies.

Table 1. Reliability of original and current study

Instruments	Source	Sample of Item	Item	Reliability	
				Original Study	Current Study
MTEBI *PMTE *MTOE	(Enochs et al., 2000)	I know the steps necessary to teach mathematics concepts effectively.	PMTE = 13 MTOE = 8	PMTE = 0.88 MTOE = 0.77	
CTI	(Wang et al., 2004)	I feel confident I can consistently use educational technology in effective ways.	22	0.96	0.959
TPACK	(Alshehri, 2012)	I know how to use digital technologies to represent mathematical ideas.	28	0.84	0.957

The score for each item was based on a five-point Likert scale. Every data item was analyzed using the Statistical Package for Social Sciences (SPSS) version 22. Descriptive analysis such as mean, percentage, and the standard deviation was employed to interpret the data. Besides, Pearson's Correlation Coefficient was used to determine the relationship between the mathematics teacher's self-efficacy of technology integration with TPACK and all sub-constructs.

RESULTS AND DISCUSSION

This study indicates that some of the female mathematics teachers were dominant in this survey distribution with 56 (84.8%) from 66 teachers. Details of descriptive analysis of age and teaching experiences of samples based on gender shown in Table 2.

Table 2. Crosstabulation of age and teaching experience based on gender

Gender	Male	Percentage	Female	Percentage
Age				
26 – 35	1	1.52%	10	15.15%
36 – 45	4	6.06%	23	34.85%
≥ 46	5	7.58%	23	34.85%
Teaching Experience				
< 7	1	1.52%	3	4.55%
7 – 10	0	0	7	10.61%
11 – 18	4	6.06%	22	33.33%
> 18	5	7.58%	24	36.36%

Table 3 shows the descriptive analysis of construct self-efficacy of technology integration and TPACK. The skewness and kurtosis for both constructs indicate that the data has a normal distribution because they are still in the range ±2.0 (George & Mallery, 2010). The means for mathematics teacher's self-efficacy of technology integration shows higher means than the mathematics teacher's TPACK with a value of 3.8026. However, both means and standard deviation for both constructs show that mathematics teachers have positive self-efficacy of technology integration and TPACK. The findings had been agreeing by Keser et al. (2015) that teachers have a positive self-efficacy of technology integration and TPACK.

Table 3. Descriptive analysis of construct

Construct	Max Value	Min Value	Mean	Std. Dev.	Skewness		Kurtosis	
					Stat.	Std. Error	Stat.	Std. Error
SETI	4.85	2.88	3.8026	0.35739	-0.021	0.295	0.851	0.582
TPACK	4.46	2.32	3.6339	0.39992	-0.897	0.295	0.937	0.582

*SETI = *Self-efficacy of Technology Integration*

*TPACK = *Technological Pedagogical Content Knowledge*

According to Creswell (2009), the reliability index usually referred to show that the instrument is stable and reliable to use, and the accepted value is above 0.70. For the reliability of the instrument used in this study, it shows that the reliability index through Cronbach Alpha, according to the constructs of self-efficacy of technology integration and TPACK are 0.959 and 0.957, respectively. Hence, the reliability index for the whole instrument shows the value of 0.976. These values indicate that this instrument is reliable to determine mathematics teacher's self-efficacy of technology integration and technological pedagogical content knowledge. The reliability of each sub construct in TPACK shown in Table 4.

Table 4. Reliability of each sub construct in TPACK

Sub Construct	Cronbach Alpha
TK	0.895
CK	0.803
PK	0.808
PCK	0.813
TCK	0.930
TPK	0.928
TPACK	0.911

By referring to the objective of this study, the findings based on gender and teaching experience are list below. In line with the first objectives in established the mathematics teacher's self-efficacy of technology integration and TPACK based on gender, a t-test was employed. Besides, one-way ANOVA was applied to verify the mathematics teacher's self-efficacy of technology integration and TPACK based on teaching experience. Before doing the analysis, Levene's test used to check the homogeneity of variance for both t-test and ANOVA. The Levene's Test done for all test show that the variance was equal and significant.

Table 5 shows the result of the mathematics teacher's self-efficacy of technology integration based on gender. The effect size of this independent sample t-test has a modest effect, $d = 0.48$ (Cohen, Manion, & Morrison, 2007). From the result, $t(64) = 1.394$ is not significant as $p > 0.05$. Therefore, it

indicates that there is no significant difference between genders for the mathematics teacher's self-efficacy of technology integration. It seems there is no impact on being male or female for mathematics teachers on their self-efficacy when integrating technology.

Table 5. T-test result of mathematics teacher's self-efficacy of technology integration based on gender

Gender	n	$\bar{\text{x}}$	sd	df	t	p
Male	10	3.9467	0.35504	64	1.394	0.168
Female	56	3.7769	0.35479			

The result of the mathematics teacher's TPACK based on gender shown in Table 6. The effect size of this independent sample t-test has a modest effect, d= 0.29 (Cohen et al., 2007). The results show that t (64) = 0.749, p > 0.05. Therefore, they are no significant difference between genders for the mathematics teacher's TPACK. It also means there is no impact on being male or female for mathematics teachers on their knowledge of technology integration.

Based on gender, there is no significant difference between the mathematics teacher's self-efficacy and TPACK. Keser et al. (2015) had found the same result, but it was among pre-service teachers. However, there is a difference with the result of the study among pre-service mathematics teachers based on TPACK competencies and self-efficacy (Erdogan & Sahin, 2010). According to Sang et al. (2010) and Adalier (2012), self-efficacy is more dominant to the male teachers. It is in contrast to the result of Gulten et al. (2011), who stated that self-efficacy is more dominant to female teachers.

Table 6. T-test result of mathematics teacher's TPACK based on gender

Gender	n	$\bar{\text{x}}$	sd	df	t	p
Male	10	3.7214	0.27396	64	0.749	0.457
Female	56	3.6183	0.41845			

For the result of mathematics teacher's self-efficacy of technology integration based on teaching experience (Table 7), it shows that there is no significant difference [F (3, 62) = 0.893, p > 0.05]. Therefore, it shows that teaching experience is similar among mathematics teacher's self-efficacy of technology integration. It also means teaching experience does not have any impact on mathematics teacher's self-efficacy when integrating technology. It has been agreed by Salani (2013) that gender and teaching experience did not play an essential role in teacher belief and ability to integrate technology. Therefore, either the teachers are male or female or how long had been they worked, it not necessary as long as they had a positive self-efficacy to integrate technology.

Table 7. ANOVA results of mathematics teacher's self-efficacy of technology integration based on teaching experience

Sources	Sum of Square	df	Mean Square	F	p
Contrast	0.344	3	0.115	0.893	0.450
Error	7.959	62	0.128		

Table 8 shows the result of the mathematics teacher's TPACK based on teaching experience, and it shows that they are no significant difference [F (3, 62) = 0.609, p > 0.05]. Therefore, it also indicates that there are no differences between the mathematics teacher's TPACK based on teaching experience. It also means teaching experience does not influence the mathematics teacher's knowledge of technology integration. From the result of the mathematics teacher's self-efficacy and TPACK based on teaching experience, it also shows no significant difference, which concurs with Buabeng-Andoh (2012).

Table 8. ANOVA results of mathematics teacher's TPACK based on teaching experience

Sources	Sum of Square	df	Mean Square	F	p
Contrast	0.298	3	0.099	0.609	0.611
Error	10.098	62	0.163		

Meanwhile, the results above show the mathematics teacher's self-efficacy of technology integration and TPACK are closely related. According to Cohen (1988), there were three categories of correlation: small (0.10 – 0.29), medium (0.30 – 0.49), and high (0.50 – 1.00). Therefore, the result of Pearson's Correlation Coefficient shows mathematics teacher's self-efficacy of technology integration, and every sub construct of TPACK used in this study are strongly related. The Pearson Correlation Coefficient of mathematics teacher's self-efficacy and each sub construct in TPACK shown in Table 9.

Table 9. Pearson correlation coefficient of mathematics teacher's self-efficacy of technology integration and each sub construct in TPACK

Sub Construct		SETI
TK	Pearson Correlation (r)	0.638**
	Sig. (2-tailed)	0.000
	N	66
CK	Pearson Correlation (r)	0.666**
	Sig. (2-tailed)	0.000
	N	66
PK	Pearson Correlation (r)	0.661**

Sub Construct		SETI
	Sig. (2-tailed)	0.000
	N	66
PCK	Pearson Correlation (r)	0.607**
	Sig. (2-tailed)	0.000
	N	66
TCK	Pearson Correlation (r)	0.645**
	Sig. (2-tailed)	0.000
	N	66
TPK	Pearson Correlation (r)	0.663**
	Sig. (2-tailed)	0.000
	N	66
TPACK	Pearson Correlation (r)	0.733**
	Sig. (2-tailed)	0.000
	N	66

**0.01 (2-tailed)

Overall, from Table 10, the relationship between mathematics teacher's self-efficacy of technology integration and all sub-constructs in TPACK is given r = 0.825, n = 66, p < 0.01. From the result, it shows that mathematics teachers in this study have positive and high self-efficacy of technology integration with the TPACK and its sub-constructs.

Table 10. Pearson correlation coefficient of mathematics teacher's self-efficacy of technology integration and TPACK

Construct		TPACK
SETI	Pearson Correlation (r)	0.825**
	Sig. (2-tailed)	0.000
	N	66

**0.01 (2-tailed)

The results of correlation for all sub-constructs in the TPACK instrument with only one sub-constructs that were TPACK show there was a strong relationship with mathematics teacher self-efficacy of technology integration. The rest of the sub-constructs (TK, PK, CK, PCK, TCK, and TPK) show a moderate relationship with mathematics teacher's self-efficacy of technology integration. However, overall, there is a statistically significant relationship between the mathematics teacher's self-efficacy of technology integration and TPACK. Those results concur with Abbitt (2011), Kazu and Erten (2014), and Semiz and Ince (2012), who detected the level of teachers' self-efficacy to have a positive relationship with TPACK and all sub-constructs. Meanwhile, there was a study that found mathematics

teachers had a positive self-efficacy when related to TPACK, but they were more confident in pedagogical knowledge (Alshehri, 2012). In this study, mathematics teachers' self-efficacy of technology integration had a strong relationship with the TPACK construct that involved interaction of all knowledge.

CONCLUSION

Mathematics teachers with knowledge of technology integration would possess a positive self-efficacy when integrating technology in teaching and learning. Besides, the mathematics teacher's self-efficacy of technology integration and TPACK is not affected by gender or teaching experience. It implies that gender and teaching experience are not critical factors in this study. Mathematics teachers can still integrate technology as long as they have a positive self-efficacy and knowledge to do it. Hence, to have a more comprehensive view of this study, research on other individual factors such as academic qualification and technology courses they received in school can be done in the future. Besides, this study still has weaknesses due to the small sample size. Therefore, to gain more data, researchers recommended the number of samples to be increasing in the future study.

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