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Technological, Pedagogical, And Content Knowledge (TPACK) Perceptions Of Junior High School English Teachers In Samarinda

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Abstract

Technological Pedagogical Content Knowledge (TPACK) competency is a relevant competency that teachers must have in line with the 4.0 era where technological developments are very necessary. This research aims to find out how Technological Pedagogical Content Knowledge (TPACK) perception of junior high school English Teachers in Samarinda and find out whether there are differences in the TPACK perception on factors of gender, age and teaching experience. The sample of study was 42 teachers who were willing to fill out the questionnaire on the distributed Google Form. The results of this research were that the highest TPACK perception was in the Content Knowledge component at 77.98% and the lowest was in the TPK component at 70.12%. The results of this research show that there are no differences in perception based on gender, age, or teaching experience where the Sig (2-tailed) value is> 0.05 so there is no difference in three factors.

Keywords: TPACK, Perception, Gender, Age, Teaching Experience

1. Introduction

In the sphere of education, teachers are crucial in assisting students in achieving effective learning objectives. Many factors influence the good or bad quality of education, one of which is a professional teacher. It is the responsibility of teachers to create responsibilities for achieving national education goals (Yunus, 2016).

For a teacher to be regarded as a professional, they must fulfill several prerequisite competencies. Based on national education policy, there are additionally four types of teacher competence, as listed in Explanation of Government Regulation Number 19 of 2005 concerning National Education Standards, including pedagogical competence, personal competence, social competence, and professional competence.

Therefore, professional teachers are expected to be able to have adequate knowledge about TPACK, because TPACK is in the realm of the four main competencies that a teacher must have. TPACK describes a teacher's ability to use pedagogical and technological approaches to facilitate learning of specific content (Malik et al., 2019).

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There has been a lot of discussion about the application of technology in education which has increased teacher professionalism (Passey, 2015). Incorporating technology into the learning carried out by teachers is very necessary because technology is expected to provide a creative and effective learning process. TPACK refers to a reliable knowledge structure that teachers use to help them teach more effectively with technology (Hsu, 2015).

Based on the previous discussion, this research was carried out to analyze the TPACK perceptions of junior high school English teachers in Samarinda. With research question 1) How are the Technological Pedagogical and Content Knowledge (TPACK) perceptions of Junior High School English Teachers in Samarinda? 2) Are there differences in perceptions of English teachers' Technological Pedagogical Content Knowledge (TPACK) according to gender, age, and teaching experience?

2. Literature Review

Research on TPACK has been carried out by several parties before. The research conducted by Ozudogru (2019) which aims to develop and validate the TPACK scale for use in investigating the level of knowledge of mathematics teachers in the TPACK component, and investigate whether the TPACK level of mathematics teachers differs in terms of gender, teaching experience, and school level. This study uses a survey research design. Data was collected from 202 mathematics teachers in the spring semester of the 2016-2017 school year. MANOVA was used for data analysis. This study used the TPACK instrument with a 5-point Likert scale, 39 valid and reliable items consisting of six components: (1) Technology Knowledge, (2) Pedagogical Knowledge, (3) Content Knowledge, (4) Technology Content Knowledge, (5) Pedagogical Content Knowledge, and (6) TPACK. The results also reveal that there are significant differences between the gender domain and the technological knowledge that supports male teachers. However, it was found that teaching experience and school level had no significant effect on the TPACK domain.

Further research was conducted by Restiana & Pujiastuti (2019). This study seeks to describe teachers' understanding of TPACK. This research was conducted on 24 high school mathematics teachers in underdeveloped areas in Banten province. This study uses a quantitative descriptive approach where differences in the effect of age, gender, and teacher teaching time on the TPACK construct are analyzed using analysis of variance (ANOVA). The results of this study indicate that among the TPACK components, only TK (Technological Knowledge) and TCK (Technological Content Knowledge) have a significant correlation with teachers' TPACK knowledge and teachers' perceptions of TPACK are significantly influenced by age factors, while gender and teacher's length of teaching are not significant effects.

3. Methods

Quantitative research methodology was used in this study. Quantitative research is a research design used to test several objective theories based on the relationship between each

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variable(Creswell, 2014). Responses to a questionnaire about TPACK perceptions are used as the quantitative data for this study. The questionnaire will be used as the main instrument for collecting data using a Google form which will then be distributed to respondents via WhatsApp.

Purposive sampling was the method of data sampling used in this study. According to Fraenkel & Wallen (2009), the purposive sample is consisting of individuals who meet certain criteria or are assumed to be representative of the information provided. The sample in this study was English teachers who teach at junior high schools in Samarinda who were willing to fill out a questionnaire distributed via Google Form and consisted of 42 teachers.

This study used a questionnaire adapted from a journal article created by Koh and Sing (2011) for data gathering to measure teachers' TPACK perceptions with a total of 28 statements containing 6 TK items, 6 PK items, 3 CK items, 4 TPK items, 2 TCK items, 2 PCK items, and 5 TPACK items. The Likert scale for this study is the scale required for the choice of answers to this questionnaire.

The instruments for this study were obtained from journals written by Koh and Sing (2011) which have been modified in accordance with the population to be studied. The validity testing method used for the instrument is the construct validity method. The results of this survey can be used to validate the regression model that combines all of TPACK components established by Mishra and Koehler (2006) (Koh & Sing, 2011). Reliability refers to the level of constancy or determination of measurement results. An instrument that consistently produces consistent findings is reliable (Fraenkel & Wallen, 2009). The reliability test that was carried out in this research was the Cronbach's Alpha coefficient and the result was 0.95 > 0.6, so the instrument can be said to be reliable.

The data was analyzed using descriptive statistics to answer the first research question. The main advantage of descriptive statistics is that it can represent large amounts of data using only a few indices, such as the mean and median (Fraenkel and Wallen, 2009). The answers to the questionnaire are in the form of statements based on the Likert scale.

Table 1. Likert Scale 1-5

Category	**Score**
Strongly Agree	5
Agree	4
Neutral	3
Disagree	2
Strongly Disagree	1

The percentage value for each TPACK competency statement item is then calculated using the following formula.

$$P = \frac{Ts\ (Total\ Score\ Obtained)}{X\ (Maximum\ Score)} \times 100\%$$

(Shofani et al., 2022)

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The scores that have been collected are then converted into percentages and categorized into TPACK competencies in the table below.

Table 2. TPACK Competency Category Assessment

Interval Value (%)	Interpretation
84,01 - 100	Very high
68,01 - 84,00	High
52,01 - 68,00	Medium
36,01 - 52,00	Low
20,00 - 36,00	Very low

(Shofani et al., 2022)

Then, to answer the second research question, teachers' TPACK perceptions were analyzed using the Independent Sample t-test assisted by SPSS 22. The independent t-test is used if there are two experimental conditions and each condition has different participants (Field, 2009). This test will be carried out to see whether there are differences in teachers' perceptions of TPACK based on gender, age and teaching experience.

4. Result

1. TPACK Perceptions of JuniorSchool English Teachers in Samarinda

   The TPACK perception questionnaire response data was analyzed and then described based on 7 (seven) domains, namely Content Knowledge (CK), Pedagogical Knowledge (PK), Technological Knowledge (TK), Technological Content Knowledge (TCK), Pedagogical Content Knowledge (PCK), Technological Pedagogical Knowledge (TPK), and Technological Pedagogical Content Knowledge (TPACK).

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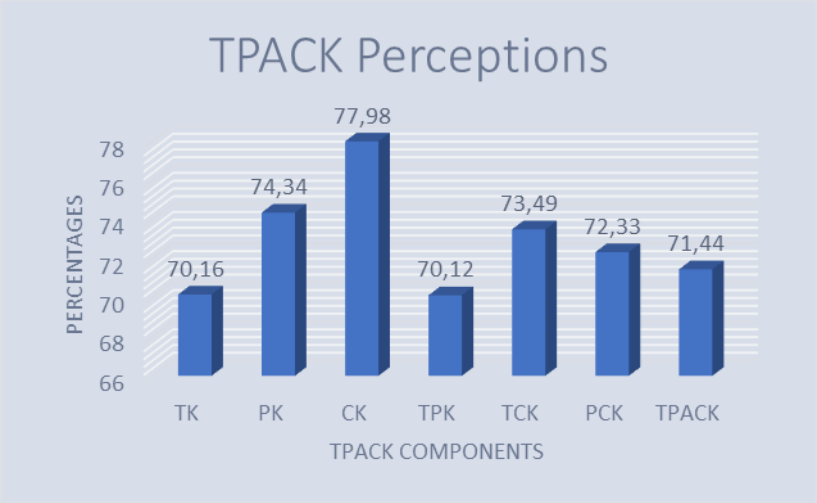

Picture 1. Percentages of TPACK of English Teachers in Samarinda

Content Knowledge (CK)

Based on picture 1, the perception of English teachers in Samarinda on the CK component is in the high category with an average score 77.98%. The teacher's score is calculated based on calculating the total score on 3 statements which are CK indicators.

It can be seen that teachers perceive themselves as having high Content Knowledge (CK) abilities with an average score that falls within the high category, where CK is the ability to understand, explain and apply the concepts of the material to be taught to students.

Pedagogical Knowledge (PK)

As in picture 1 above, teachers' perceptions of TPACK in the PK component obtained an average of 74.34% which is included in the high category. The PK score recapitulation is calculated based on the total score of 6 statements indicating the PK components.

Analysis of the questionnaire on the PK component shows that teachers have a perception of their PK abilities in the high category. Pedagogical Knowledge is knowledge in carrying out teaching and learning activities, both in terms of learning design, classroom management and evaluation activities.

Technological Knowledge (TK)

Teachers' perceptions of technological knowledge (TK) are classified as high with an average score of 70.15%. The calculation of the average TK score was obtained based on the recapitulation of 6 statements in the Technology Knowledge component.

Analysis of each questionnaire item based on the average questionnaire score on the TK component shows that the teachers perceive that they have knowledge about Kindergarten in the high category. Technological Knowledge (TK) is knowledge in operating computers, solving technical problems in using technology, and following existing technological developments. So it can be concluded that teachers have a good perception of technological knowledge with an average score in the high category.

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Technological Content Knowledge (TCK)

Based on data analysis in picture 1, teachers' perceptions of the TCK component obtained an average score of 73.48% so it is included in the high category. The recapitulation of scores on the TCK component comes from calculating 2 questionnaire statements on the TCK component.

Based on the statement on TCK component indicators, the results of the score analysis on TCK component show that teachers have a perception in the high category, which means that teachers perceive them as having a high ability to utilize technology to master teaching materials and prepare teaching materials to be used in class.

Pedagogical Content Knowledge (PCK)

The results of teachers' PCK perceptions are obtained as shown in picture 1. Teachers' perceptions of PCK possess within the range of 72.32% average score, putting them in the high category. calculated from the recapitulation of 2 statements on PCK component indicators.

Questionnaire analysis of PCK indicators shows that teachers feel capable of choosing learning methods that are appropriate to the learning material they will teach. The teachers' perception of their high PCK ability can be concluded based on the average score obtained above, in other words the teacher is able to combine PK and CK components in a lesson.

Technological Pedagogical Knowledge (TPK)

The results of teachers' TPK perceptions are presented in Figure 1. Referring to picture 1, With an average score of 70.11%, it is seen that teachers have perceived their TPK abilities belong into the high category obtained based on the calculation of scores on 4 statement items on the TPK component indicators. It can be concluded that the teachers have the perception that their ability to combine TK and PK components in learning is in the high category. This indicates that educators believe they are capable of selecting teaching strategies and approaches that are supported by relevant technology-based material.

Technological Pedagogical and Content Knowledge (TPACK)

Teachers' perceptions of the TPACK component are classified as high, referring to picture 1 where the average score for the TPACK component reaches 71.44% based on the calculation of scores on 5 statement items on the TPACK component indicators. It can be concluded that teachers are able to convey subject matter through integrating subjects, technology used, and teaching methods.

2. The differences in perceptions of the Technological Pedagogical Content Knowledge (TPACK) component of English teachers based on gender, age, and teaching experience.

2.1 Test analysis prerequisites

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In order to find out whether teachers opinions of TPACK differed from one another, an independent sample t-test was carried out in this study based on the demographic factors of gender, age and teaching experience. There are several prerequisite tests for analysis before carrying out the analysis using the independent sample t-test, namely the normality test and homogeneity test.

2.1.1 Normality test

Shapiro Wilk is the normality test method applied in this research because the 42 samples to be evaluated are less than 50 samples. Based on the gender factor, the significance value obtained was 0.091 for men and 0.377 for women. Based on the age factor data normality test, it is known that the significance value is 0.071 for ages under 35 years and 0.262 for ages above or equal to 35 years. In the normality test of the data for the length of teaching experience factor, it was found that the significance value was 0.051 for teaching experience of less than 10 years and 0.280 for teaching experience of more than or equal to 10 years. So from the results of the normality test on the three factors it can be concluded that all data is normally distributed as indicated by a significance value (Sig.) higher than the specified significance level of 0.05 (α).

2.1.2 Homogeneity Test

The homogeneity test is one of the prerequisite tests used by researchers in this research. Homogeneity test is also one of the tests that must be carried out before carrying out analysis tests. The homogeneity test results show the gender factor has a significance value of 0.254 > 0.05. Thus, based on the significance value (Sig.), it can be said that the gender factor data is homogeneous which is higher than the specified significance level of 0.05 (α). The significance value of the age factor is 0.109 which is higher than 0.05. This indicates the homogeneity of the age factor data. But the teaching experience factor's significant value is just 0.026 less than 0.05. This shows that the teaching experience factor data is not homogeneous. The independent sample t test is a parametric test, where two samples are tested using several test conditions or assumptions. However, if one of the conditions is not met, the independent sample t test can be replaced with a nonparametric statistical test that is suitable for two independent samples. According to Quraisy & Madya (2021), To ascertain the difference in the average of two independent samples, the parametric independent sample t test and the non-parametric Mann-Whitney test are both designed to be used. MannWhitney U, like other nonparametric tests, does not rely on distributional assumptions (Nachar, 2008). So there is an exception in the teaching experience factor where the researcher used the Mann Whitney test because the Independent Sample t-test requirements were not met.

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2.1 Independent Sample t-Test

Table 3. Gender independent sample t-test

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Score	Equal variances assumed	1,342	,254	-1,076	40	,288	-2,896	2,691	-8,336	2,543
	Equal variances not assumed			-1,191	37,755	,241	-2,896	2,431	-7,820	2,027

Based on the results in table 4.9 in the gender factor in the section (Equal variances assumed), the output value of Sig. (2-tailed) is 0.288 > 0.05. So it can be concluded that there are no significant differences in teachers' perceptions regarding TPACK based on gender factors.

Table 4. Age independent sample t-test

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Score	Equal variances assumed	2,680	,109	1,437	40	,158	3,667	2,551	-1,489	8,823
	Equal variances not assumed			1,437	34,547	,160	3,667	2,551	-1,515	8,848

Based on the results in table 4.10 in the section (Equal variances assumed), the output value of Sig. (2-tailed) is 0.158 > 0.05. So it can be concluded that there are no significant differences in teachers' perceptions regarding TPACK based on age factors.

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Table 5. Teaching experience mann whitney u test

Mann-Whitney U Test

	Score
Mann-Whitney U	178,000
Wilcoxon W	388,000
Z	-1,061
Asymp. Sig. (2-tailed)	,289

Based on the results in table 4.11, it can be seen that the Sig. (2tailed) 0.289 > 0.05. So it can be concluded that there is no difference in teachers' perceptions regarding TPACK based on teaching experience.

5. Discussion

Based on the results of the descriptive analysis that has been carried out, the scores of the seven TPACK components have a percentage range that is interpreted as being in the high category. Where based on the percentage score, CK is the highest component among the other components with an average score of 77.98%. Meanwhile, TPK is the component that got the lowest percentage score with a score of 70.12%.

Even though it is included in the high interpretation category, the average perception score for the TPK component is the lowest among the other components. This is consistent with Innaha and Setyaningsih's (2018) studies who examined the components of teachers' TPK. TPK knowledge is very important for teachers, especially in the lesson plans that will be made. Innaha and Setyaningsih (2018) stated that the low knowledge scores of teachers regarding TPK were due to the minimal use of technology in teaching and the lack of knowledge of several features available on computers. Based on research results, junior high school teachers in Samarinda perceive themselves as having high TPK abilities. In other words, they have high knowledge in integrating technology into the learning design that they will use even though based on the average score the TPK component is the component that gets the lowest score. The cause of high TPK ability is also influenced by factors such as the availability of technological equipment and facilities in schools, making it easier to create and use technology-based learning media (Setyaningsih et al., 2022).

In the highest component, CK is in the high category with 77.98% average score. The high average percentage score on the CK component shows that junior high school teachers in Samarinda have the highest perception of their CK abilities. And indirectly they assume they have high knowledge in their subject, English. The research by Restiana (2018) also showed that CK was the component that obtained the highest average value. With a high CK score, junior high school teachers are able to master the learning material well, but still need

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improvement in other TPACK components (Restiana, 2018). The high average CK score obtained shows that teachers are able to prepare themselves in class with knowledge of concepts, example questions, and theory of the material to be taught in order for students to comprehend the content presented at each meeting with ease (Murtiyasa & Atikah, 2021). In accordance with the definition of the CK component, in other words, it can be said that junior high school English teachers in Samarinda have a strong belief in their capacity to learn the material being taught, which is English.

To find out whether there are significant differences in the factors gender, age and teaching experience, researchers have carried out an independent sample t-test on these three factors on the perceptions regarding TPACK of junior high school teachers in Samarinda.

For the gender factor, the results obtained was Sig. 0.288 and higher than 0.05. So it can be stated that there are no differences in perceptions regarding TPACK among English teachers based on gender. This aligns with the results of Koh and Sing's (2011) study that concluded gender does not cause significant differences in mastery of TPACK based on the perception of research respondents that men and women have the same rights and opportunities in mastering aspects of TPACK related to mastery of technology, pedagogy. and content. However, this is contrary to research by Ozudogru (2019) which states that gender has a significant influence and difference. Male teachers have a high perception of the technology component of TPACK because male teachers are more interested in technology issues than female teachers so there is a difference (Ozudogru, 2019). Knowledge of technology is often considered a place for males. Compared to the majority of men who continue to hold significant positions, women often play a smaller part in the development of information technology(Tuty and Tambun, 2021). However, the results obtained by researcher in this study show that regarding the gender factor there are no differences in the perceptions of junior high school English teachers in Samarinda. Despite the common perception that males are more competent than women when it comes to technology, female teachers who teach English in junior high schools throughout the city of Samarinda are able to keep up with male teachers in their perception of knowledge about TPACK.

On the age factor, the significance value obtained was 0.158, indicating that there was no difference in the perception of TPACK among junior high school English teachers in Samarinda based on the age factor. This is in accordance with study that was done by Koh & Sing (2011) where the results of their research concluded that the influence or relationship between age and the TPACK construct was almost negligible. The age factor does not influence or cannot determine the level of perception of teachers' TPACK abilities (Restiana & Pujiastuti, 2019). The age factor is often considered to be something that influences understanding of technology, where age determines the generational differences between each person, the older generation is often considered to be deficient in the process of understanding and using technology. Hapsari et al (2022) also stated that younger teachers should tend to be more accustomed to using technology and have a high level of productivity compared to older teachers. However, in this study, researchers found that there were no differences in the perceptions regarding TPACK held by junior high school English teachers in Samarinda based on the age factor. Both teachers aged over 35 years and under have a high perception of their TPACK abilities, wherein older

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teachers may further their technology literacy and keep up with technological developments in education.

In the teaching experience factor, there is also no significant difference in the TPACK perception of junior high school teachers in Samarinda with the Sig value. 0.289 is higher than 0.05. This is in line with Restiana and Pujiastuti's research which states that teaching experience factors do not make a difference to teachers' TPACK perceptions. According to Chuang's (2011) research, teaching experience has a strong influence on teachers' TPACK perceptions because teachers with more teaching experience have higher knowledge about TPACK, especially in the PK and PCK components in contrast to teachers who have taught for fewer than ten years. However, this research shows that teachers with fewer than ten years of teaching expertise also highly regard their TPACK. Junior high school English teachers in Samarinda who have teaching expertise of fewer than ten years are able to match teachers who have over ten years of teaching expertise by having a high perception of their TPACK. Even though they have less teaching experience, teacher with fewer than ten years of experience was born in an era of rapid technological development so they are considered to have more knowledge about technology, especially in its integration into the learning process. This is what might enable them to match the TPACK abilities of teachers who have more than 10 years of teaching experience so that there is no significant difference in the teaching experience factor. This shows that there are no differences in perceptions regarding the teaching experience factor so that the teaching experience factor can be ignored in this research conducted on junior high school teachers in Samarinda.

6. Conclusion

In this section, the researcher discusses the findings mentioned above to answer the research questions: 1) How are the Technological Pedagogical and Content Knowledge (TPACK) perceptions of Junior High School English Teachers in Samarinda? 2) Are there differences in perceptions of English teachers' Technological Pedagogical Content Knowledge (TPACK) in Samarinda based on gender, age, and teaching experience?

1. Technological Pedagogical and Content Knowledge (TPACK) perceptions of Junior High School English Teachers in Samarinda

Based on the findings of the study and discussions, it is possible to conclude that the perception of Technological Pedagogical Content Knowledge (TPACK) of junior high school English teachers in Samarinda as a whole is at the high category, where the findings of the seven TPACK components obtained an average score which is included in high interpretation category with Content Knowledge (CK) which is the component with the highest score percentage of 77.98% and Technological Pedagogical Knowledge (TPK) as the lowest component with a score percentage of 70.11%.

2. Differences in perceptions of Technological Pedagogical and Content Knowledge (TPACK) of junior high school English Teachers in Samarinda based on gender, age and teaching experience

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The findings of the analysis of the Mann-Whitney and Independent Sample T-tests that have been done, there are no significant differences in the factors of gender, age, and teaching experience on the perception of TPACK of English teachers in Samarinda where the significance values for the three factors are higher than 0.05.

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