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Teachers' perception of Technological Pedagogical and Content Knowledge (TPACK) in Teaching at Senior High School in Pekanbaru

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Abstract:

A framework called TPACK outlines the knowledge that instructors require in order to incorporate technology into the planning, carrying out, and assessing of learning. TPACK integrates diverse learning tactics, combining appropriate technology with thinking strategies for when, when, and how to employ technology knowledge, pedagogy, and material. Integration of technology in teaching is carried out by teachers at Senior High School in Pekanbaru. The aim of this study is at explaining the teachers' perception of TPACK in the teaching process at Senior High School. The method was descriptive quantitative, a survey research design with a sample of 30 teachers. The entire sampling method is employed. The major tool for gathering data was the questionnaire. The data were obtained by descriptive analysis, using the sum of the scores, the mean, and the standard deviation, and then were descriptively interpreted. The results indicate that most teachers believe their level to be quite high. Measured by averaging the seven TPACK indicators—technological knowledge, pedagogical knowledge, content knowledge, technological pedagogical knowledge, technological content knowledge, and technological pedagogical knowledge—into a single score. The results suggest that teachers have the skills necessary to incorporate the TPACK framework into their lesson plans.

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Keywords: Teachers' Perception, Information and Communications Technology (ICT), Technological Pedagogical and Content Knowledge (TPACK)

1. BACKGROUND

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In the 21st century, the teaching and learning process cannot be separated from the use of technology, technology is very inherent in various aspects of life as well as in the field of education. Mastery of knowledge about technology in education by teachers makes teachers able to adapt to the current developments. As professional teachers, teachers should be able to develop competence in themselves, especially in the field of learning. One way to develop this competence is by mastering and utilizing technology. In the current era, the use of technology-based media is a must, because the role of technology in learning is as a medium that has been designed in a modern way and is used as theory and practice in learning, as a learning resource. The twenty

first century is referred to as the digital age, in which all sectors, which includes schooling, must be digitalized, and wherein technology play a essential position in education (Henriksen et al., 2016).

Mastery of ICT is one of the competency requirements for trainers, helps them to carry out their responsibilities (planning, demonstrating mastery, assessing and assessing assessment results) and as a means of finding and downloading learning resources. Therefore, trainers at all levels must be able to continue learning ICT to meet the needs of these talents. Government Law No. 74 of 2008 on Teachers states that "Teacher's skills include teaching ability, personal⁷ ability, social ability and professional ability acquired through professional training". ICT got profound effects on the teaching and learning for both the teachers and students (Ghavifekr & Rosdy, 2015), and provided the¹² opportunity to create creative and effective learning (Dema & Moeller, 2012)

Today, the¹² use of ICT devices and equipment in education is commonplace and students have developed in their use of ICT, but integrating ICT into the classroom has been a challenge for many years (Shafer, 2008). The rapid development of technology is a challenge for schools, especially for teachers and related institutions to adapt to significant changes. To overcome these challenges, the integration of technology in learning can be used by teachers with a framework, namely, Technological Pedagogical and Content Knowledge (TPACK). Nowda,¹⁹ Teaching and learning process is integreted in technology, technology is a learning¹² urces, so teachers are able to use ICT in teaching and learning process. ICT enables teachers to meet the various learning needs of their students through personalized learning. To ensure that every student receives unique attention and support, they can use digital tools to establish individualized learning paths, adaptive assessment¹⁴ ts, and differentiated assignments.

TPACK is a framework that describes the knowledge needed by teachers to integrate technology in designing, implementing and evaluating learning. TPACK combines thinking strategies when, where, and how to use knowledge (Technology, Pedagogy and Content) with various learning strategies using right technology. Teachers utilizing the TPACK framework require technical, pedagogical, and content knowledge. In teaching, competency is the ability to teach, that is, the ability of the teacher to carry out the teaching process. However, teaching ability is inseparable from the mastery of materials (content), and the two cooperate with each other to form the concept of PCK (Pedagogical Content Knowledge). Teachers must master not only the material and concepts, but also how to properly communicate teaching and learning strategies to students.

(Koehler & Mishra, 2009) explain The problem many teachers face when integrating technology into learning is "complex and unstructured problems involving the interplay of various factors". Thus, TPACK becomes a fairly flexible knowledge framework developed by teachers to integrate technology into learning. The application of technology in teaching makes learning process more effective and efficient. In this case, it is necessary to have an understanding of how teachers perceive their knowledge. Teachers' perception of the TPACK framework is an important

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aspect of the teaching process. Therefore, this study aims to describe how teachers perceptions TPACK at one of Senior high school in Pekanbaru.

Based on these conditions, researchers are interested in conducting this research with a focus on examining how teachers perceive TPACK in teaching process. The gap of this research is Approaches and challenges to integrating technologies may differ between subjects, and this understanding can help people identify more secure integration strategies for TPACK in various fields. Therefore the researchers explained the teachers' perception of TPACK in general which does not only specialize in one type of subject area such as chemistry, science, mathematics, English, etc. However, exploring the perceptions of all teachers at senior high school in Pekanbaru. Because essentially TPACK is needed in all subject areas in schools to improve the quality of learning that is more effective and efficient.

2. METHOD

The form of this research was a quantitative descriptive research. Quantitative descriptive method which the description is in numbers or numerical (statistics) with survey research. Quantitative research is an approach to collect, analyse, interpret and write results of studies that differs from traditional quantitative methods; qualitative research is a method for collecting, analysing, interpreting and producing reports which differ from traditional quantitative methodologies (Creswell, 2009). The point is that this research is related to the elaboration of statistical figures. This study aims to describe the teachers' perception of TPACK in the teaching process. The population in this research were all teachers at senior high school in Pekanbaru then total population of all teachers is 30 teachers. The sample in this research were all teachers at One of the Senior High School in Pekanbaru namely as many as 30 teachers.

The research instrument was questionnaire. Data collection technique carried out by giving questions or written statements to respondents to be answered. Questionnaire In this case the questionnaire is designed to measure the teachers' perception. Analyze the data, the researcher used descriptive statistics presented in the form of central tendency (mean, median, and mode), as well variability (standard deviation, and range). The researcher used descriptive statistics to see the score of teachers' answers. The teachers' perception of TPACK in teaching process consists of 47 statements. Based on the research that the researcher have done using the data collection technique and the dissemination of the questionnaires, the file of the questionnaires collects as many as 30 of the respondents. The researcher processed the data through the SPSS version 20 program. The data presented using descriptive statistical techniques. The researcher used mean and standard deviation to calculate the total score of teachers' in each scale of the question. There are seven indicators in determining the teachers' perception of TPACK. The contents of this research questionnaire used 7 indicators, there are TK (Technology Knowledge), CK (Content Knowledge), PK (Pedagogical Knowledge), PCK (Pedagogical of Content Knowledge), TCK (Technological of Pedagogical Knowledge), TPACK (Technological Pedagogical and Content Knowledge). The researcher used the likert scale for collecting the data.

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The table of Likert Scale of scoring can be seen below:

10 **Table 1.** Likert Scale Scoring

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

(Sugiyono & Kuantitatif, 2009)

Based on the table above that teachers answered strongly agree were 5 person, then teachers answers the questionnaires were 4 person, while teachers answered neutral was 3, teachers answered disagree was 2 person, then teachers answered strongly disagree were one person. Statistic descriptive was used to analyze the data, the researchers analyzed the data by categorizing item into range likert scale. There were as following:

Table 2. The Range of Likert Scale

No	Average Score	Category
1.	1.00 - 1.80	Very Low
2.	1.81 - 2.60	Low
3.	2.61 - 3.20	Moderate
4.	3.21 - 4.20	High
5.	4.21 - 5.00	Very High

Source:(Ferdinand, 2014)

3. FINDINGS AND DISCUSSION

a. Technological Knowledge

A sort of teacher's knowledge on how to use digital technology is called technological knowledge. In this situation, teachers are able to employ technology and incorporate it into the learning environment. Based on the findings of the descriptive statistics, the teachers' overall capacity to incorporate technology into the teaching process was rated as high. The range of the Likert scale indicates that this indicator's mean score, which is 3.76, is high. Teachers knew well enough to use technology as digital tool for teaching.

b. Pedagogical Knowledge

Pedagogical Knowledge contains knowledge that must be mastered by teachers in the teaching process, for example, teaching methods, teaching strategies, classroom management, and assessing student activities. Based on the results of the descriptive statistics, it can be seen that, in general, teachers' ability to integrate pedagogy into the teaching process is categorized as high. The mean of this indicator was 4.02, and according to the range of the Likert scale, this score means high.

c. Content Knowledge

Content Knowledge is related to the substance of the material that must be mastered by the teacher in teaching. Understanding the material will affect students' understanding. Therefore, teachers must understand the position of content knowledge in teaching. Based on the results of the descriptive statistics, it can be seen that, in general, the content knowledge possessed by the teachers was categorized as high. The mean of this indicator was 3.91, and according to the range of the Likert scale, this score means high.

d. Technological Pedagogical Knowledge

Technological Pedagogical Knowledge is the knowledge that contains the relationship between technology and the learning process. Through this Technological Pedagogical Knowledge, teachers can understand the advantages and disadvantages of technology in teaching and use it as evaluation material. Based on the results of descriptive statistics, it can be seen that the teachers' knowledge of technological pedagogical knowledge is categorized as high. The mean of this indicator was 3.91, and according to the range of the Likert scale, this score means high.

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e. Pedagogical Content Knowledge

Pedagogical Content Knowledge is more focused on the learning process, which will be selected by the teacher based on the material being taught. PCK contains a selection of teaching methods, lesson plans, and learning support facilities. Based on the results and descriptive statistics, it can be concluded that, in general, the teachers' knowledge of pedagogical content is categorized as high. The mean of this indicator was 3.90, and according to the range of the Likert scale, this score is high.

f. Technological Content Knowledge

Technological Content: Knowledge about the influence of technology on a scientific discipline. That is, how much influence does technology have on the development of a scientific discipline? So this Technological Content Knowledge component is about how the teacher's knowledge of integrating technology is combined with content in teaching activities in the classroom. In this indicator there are 4 statements out of 47 items that were asked of the respondents to this research. Based on the results of the descriptive statistics, it can be seen that, in general, the teacher's knowledge of technological content was categorized as high. The mean of this indicator was 3.72, and according to the range of the Likert scale, this score means high.

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g. Technological Pedagogical and Content Knowledge

Technological, pedagogical, and Content Knowledge is an integration between the three components, namely technology, pedagogy, and learning content. In this era of all technology, teachers are required to be proficient in integrating the three. In this indicator, there are 5 statements out of 47 items that were asked of the respondents to this research. Based on the results above, it can be seen that, in general, the knowledge possessed by teachers in the TPACK was categorized as high. The mean in this indicator was 3.88, and according to the range of the Likert scale, this score means high.

In general, the teachers have positive perception in using of TPACK in teaching process. It showed by the general mean score which was 4.26 that means categorized in very High. Based on the findings above, there are several ideas that we can get from the knowledge competency data on TPACK in the seven indicators of Technological Knowledge. In addition, if the researcher concludes that the statement above on all indicators can be categorized at a high level. Therefore, from this thought, it can be seen how the teachers' perception of TPACK in the teaching process at senior high school. Teachers' perception in using TPACK at senior high school in pekanbaru has positive perceptions toward TPACK.

Similarly with previous research by (Williams, 2017) which stated that the result of their research is that teachers have a positive perception of the use of technology in schools. Using technology can help the teachers' work when making lesson plans related to the content of the

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material until it is poured into the teaching and learning process. Students' ability in listening, it can increase after applying video as learning media in the classroom (Kasriyati, 2019). While (Ghavifekr & Rosdy, 2015) that Both teachers and kids benefit greatly from ICT integration. One of the key elements in the success of era-based teaching and learning is teachers who are well-prepared for using ICT resources. Additionally, it was shown that professional development training programs for instructors were crucial in raising pupils' quality of learning. Other aspects of ICT integration, particularly from a management perspective in relation to strategic planning and policy-making, may need to be taken into account for upcoming studies.

On the other hand, TPACK has the potential to reaffirm a teacher's comprehension of how technologies might be used effectively as a pedagogical tool (Martin, 2015). Students' engagement in the learning material can be increased by using digital products (Chairunisa & Kasriyati, 2021). However, (Herdi et al., 2022) demonstrated that the use of ICT is a useful teaching tool since it allows teachers greater creative freedom and makes creating lesson plans easier. ICT is arguably essential for assisting the teaching and learning process. TPACK can assist teachers and students in the teaching and learning process, according to previous studies. Today, ICT and education go hand in hand. But in contrast to earlier studies, researchers looked at teachers' perceptions of all lessons in senior high school. In general, the teachers' perception had a positive perception toward the use of TPACK in teaching process. It showed by the general mean score which was 4.26 that means categorized in very High categorization.

4. CONCLUSION

This article can be concluded that the teachers' perception of TPACK in teaching process at One of the Senior High School in Pekanbaru is very high level. This score can be interpreted that the teachers have a positive perception, it also can integrate TPACK in the teaching process activities. In TPACK, the most important component is technology. In this case, technology is combined with content and pedagogy. From each indicators, the teachers' perception as a whole is at a high level. Therefore, it can be concluded that the teachers have good knowledge and able to use the TPACK framework in the teaching process carried out.

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