



Analysis Of Tpack (Technological Pedagogical And Content Knowledge) In Improving The Digital Competence Of Physical Education Teachers In South Tangerang City

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Abstract

The purpose of this study is to analyze TPACK in improving digital competence (skills, attitudes, and knowledge) of Physical Education Teachers. This study uses qualitative research. The research sample consisted of 10 physical education teachers who had completed PPG. The instrument used in this study was an interview. The results of this study are that teachers in Ciputat District have implemented hardware and software used in the teaching and learning process to provide an understanding of physical education material, good teacher delivery in facilitating students during the learning process, and supplemented with examples that can be easily understood by students, understanding and mastery of the material that must be possessed by a teacher. for teachers in Ciputat District, especially physical education teachers, various obstacles that occur to teachers in Ciputat District, one of which is the lack of use of TPACK by teachers, and the selection of appropriate teaching media to minimize TPACK learning in class by teachers.



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INTRODUCTION

In today's digital era, information and communication technology (ICT) has changed many aspects of life, including in the field of education. The use of technology in education can increase interactivity, facilitate access to information, and make the learning process more interesting. Therefore, according to (Semiz & Ince, 2012) teachers are expected to have the skills to utilize technology in learning activities, including in physical education.

Physical education also helps children to improve social skills, self-concept and allows an opportunity to experience success in a unique learning environment (Friskawati et al., 2020) Physical education also has its own challenges because it involves physical, motoric, and social aspects in the learning process. Although technology can support physical learning, physical education teachers often face limitations in terms of using technology effectively. For example, sports training, movement assessment, or understanding theories related to health and fitness often require a more conventional and practical approach.

According to (Fauziah et al., 2022) to ensure the physical education learning process runs optimally, teachers are expected not only to master teaching materials (content knowledge) and good teaching methods (pedagogical knowledge), but also to be able to integrate relevant technology (technological knowledge). Therefore, the competence of physical education teachers needs to be improved, not only in mastering physical materials, but also in utilizing existing technology..

According to (Mishra & Koehler, 2016) TPACK is a good teaching basis related to technology in learning about content or material pedagogically. (Prasetya et al., 2019) TPACK is a framework that describes how three main areas of knowledge—content knowledge, pedagogical knowledge, and technological knowledge—can interact in a learning context. In this framework, physical education teachers are expected to be able to combine knowledge about sports (content), effective teaching methods (pedagogical), and supporting technology (technological) to improve the quality of learning.

The general principle of using technology, in this case ICT/TPACK, was

put forward by (Agustina et al., 2023) as follows :

1. **Effective and Efficient.** The benefits of information and communication technology (ICT) in teaching must be considered by considering the effectiveness of learning, such as increased knowledge, ease of access, and affordable time and cost..
2. **Optimal.** By using ICT, at least learning becomes “more” valuable than without using it. The added value provided by ICT is the breadth of coverage, up to date, modernity and openness..
3. **Interesting.** This means that in this principle, learning in class will be more interesting and arouse more curiosity. Learning that is not interesting and arouses more curiosity will be boring and counterproductive for learning..
4. **Stimulate students' creative thinking power.** By using ICT, it is certainly expected that students will be able to grow their creativity to the maximum that is within them. A child who has high creativity is certainly different from a student who has low creativity..

This study aims to analyze the Analysis of Tpack (Technological Pedagogical and Content Knowledge) in Improving the Digital Competence of Physical Education Teachers in South Tangerang City. Thus, it is hoped that solutions can be found to improve the effectiveness of physical education learning that is more innovative, interesting, and in accordance with the development of the times.

METHODS

This type of research is qualitative research. (Hendryadi, H., Tricahyadinata, I., & Zannati, 2019) defines qualitative research as a naturalistic inquiry process that seeks in-depth knowledge about the experience of social phenomena. (Creswell, J. W., & Poth, 2019) defines qualitative research as an approach or exploration to explore and understand a central symptom. The qualitative approach was chosen by the author to examine various social and cultural phenomena in a natural/scientific atmosphere, not in controlled or laboratory conditions.

Participants

According to (Sugiyono., 2018) population is a generalization area consisting of objects or subjects that have

certain quantities and characteristics determined by researchers to be studied and then concluded. The same thing according to (Arikunto, 2019) population is the entire research subject. Meanwhile, according to (Zriah, 2017), population is all data that is of concern to researchers in a certain scope and time. The population in this study were teachers who taught Physical Education, Sports and Health at Public Elementary Schools in Ciputat District, South Tangerang City, as many as 35 teachers.

Sampling Procedures

According to (Sugiyono., 2018) a sample is a portion of the number and characteristics possessed by a population. The sampling technique in this study used the Purposive Sampling technique. So the sample of this study was 10 Physical Education teachers who had participated in PPG.

Materials and Apparatus

The instrument used in this study was an interview guide containing questions for teachers about the program being run. The interview was conducted to confirm in more depth the teachers' opinions about TPACK (Technological Pedagogical and Content Knowledge) in improving the digital competence (skills,

attitudes, and knowledge) of physical education teachers.

Table 3.1 Interview instrument grid

Variables	Indicator	Question items
TPACK analysis in improving digital competence of physical education teachers	<i>Technological Knowledge</i>	13 grains
	<i>Pedagogical Knowledge</i>	11 grains
	<i>Content Knowledge</i>)	10 grains
	Preparation of Learning Tools	13 grains
	Implementation of Learning	grains

Design or Data Analysis

Data analysis is the process of systematically searching and compiling data from interviews, field notes, and documentation, and how to organize data into categories, break it down into units, synthesize it, arrange it into patterns, decide what is important and what will be studied, and draw conclusions that are easy for yourself and others to understand (Sugiyono, 2017). (Lexy J. Moleong., 2015) explains that data analysis is the act of organizing and classifying data into patterns, categories, and basic descriptive units to find themes and build working hypotheses based on the data.

Qualitative research data comes from various sources and is collected using several data collection strategies (triangulation) over time, resulting in very high data variance. The Miles and Huberman model is used in research for

data analysis. According to Miles and Huberman in (Sugiyono, 2017). data analysis in qualitative research occurs at the time of data collection and after data collection is completed within a certain period of time. Qualitative data analysis activities are interactive and ongoing until the data is saturated, at which point they are completed. Following the interactive model, Miles and Huberman provide a general pattern of analysis: Data reduction, data presentation and drawing conclusions.

RESULT

1. Analysis of Technological Pedagogical Content Knowledge (TPACK) in Improving Digital Competence of Physical Education Teachers in Ciputat District, South Tangerang City.

Technological Pedagogical and Content Knowledge (TPACK) can be the basis for developing effective learning media to teach a material and can make students more active in learning that has been applied to physical education teachers in the teaching and learning process. TPACK is a framework that can collaborate between aspects of technological knowledge and content, so that TPACK gives rise to a new paradigm, how to teach or provide

learning materials using technology, pedagogical, and good content to support supporting technological knowledge. In this study, there are several TPACK concepts that are used as references, namely Technology Knowledge (TK), Pedagogical Knowledge (PK), and Content Knowledge (CK)”

a. Technology Knowledge (TK)

Technology greatly influences the progress and development of learning, the use of hardware and software is a supporting tool for teachers in integrating technology into learning activities. Physical education teachers in Ciputat District, South Tangerang City, admit that technology is very much needed by teachers. In addition, teachers can use technology in different and innovative ways, and technology can also be used creatively. Physical education teachers in Ciputat District, South Tangerang City, need good knowledge of certain technological capabilities to help students learn certain topics or skills with the help of technology. This was also explained by Mr. Dani Ramdani, S.Pd; "The majority of physical education teachers in Ciputat District, South Tangerang City, have understood technology, thus in the

learning process, especially in physical education subjects, they have utilized existing technology, both hardware and software. Several teachers have also implemented TPACK-based physical education learning" The facilities that have been provided in schools such as technology and the internet have been utilized by teachers in order to realize a learning system that is developing in terms of science and technology.

Based on this statement, it can be interpreted that physical education teachers in Ciputat District have understood the use of technology for the smooth administration of learning, in his interview Mr. Dani Ramdani, S.Pd, also added; "Now teachers are innovative and creative in the teaching and learning process, they utilize hardware that has been facilitated by the school in the form of LCD, computers, or personal laptops. LCD here is used to display PPT, Learning Videos, or other things that support the learning process. If the laptop itself is usually used for RPP or other tasks. In addition, teachers also use software, namely basic applications, such as Microsoft Word, Excel, Powerpoint, and the like".

LCD Projector learning media is one of the electronic media that can be used

by physical education teachers in the teaching and learning process, besides that it can also help teachers in developing teaching techniques so that they can obtain more optimal results. Seeing the importance of the teaching and learning process and the role of teachers, in the development of knowledge it is necessary to develop attitudes and learning behaviors that can foster interest in learning naturally. For that, learning using learning media, especially LCD Projector media, can be an alternative in this case.

From the explanation, it can be concluded that the ability of physical education teachers in Ciputat District in understanding technology is quite good. Furthermore, Mrs. N. Komariah, S.Pd, added; "For me, in explaining gymnastics material, on average I only use video applications, power point, Microsoft Word, and Excel. Incidentally, there is also an LCD here, so if the teacher makes PPT, they use the LCD. If it's Word and Excel, it's certain, for RPP, it uses Word and if it's for grades, it uses Excel".

Technology Knowledge (TK) is the teacher's technological knowledge that makes teaching and learning easier. Teachers' abilities can be seen from the Lesson Implementation Plan (RPP) they

make through the learning media used. As mentioned in the interview above, in delivering lesson materials, teachers generally use PowerPoint software. However, it is possible that many teachers have not applied technology, in the sense that they still maximize conventional practices, using a whiteboard so that students can more easily receive and understand the material. M. Dani Ramadan, one of the students when interviewed, said that; "I understand the teacher's explanation better if I use PPT or video because it seems more exciting and not boring, besides that, as a student, I understand faster if I use learning media in the form of learning videos". The statements above are reinforced by observations made during learning.

That in the observation can be seen the way teachers teach by using technology such as hardware and software. Teachers in presenting their materials in class use the help of projectors, LCDs, and laptops to explain the material through powerpoint media and learning videos. Thus, when learning takes place, students can focus more on digesting understanding through these media because it is considered not boring and more exciting, not monotonous just

listening to explanations from the blackboard.

a) Likewise with other teachers, these teachers also use the device as a medium in delivering material to students. The reason teachers use the device is because the facilities and infrastructure have been provided by the school so that teachers use it to facilitate the learning process with existing technology. It can be concluded that the Technological Knowledge (TK) of teachers in physical education learning is;

b) a) Teachers have implemented hardware in the form of LCDs, laptops, computers, which are used in the teaching and learning process to provide an understanding of physical education material.

c) b) Also, teachers also use software such as Microsoft Word applications which are useful in learning administration, Microsoft Excel is useful in processing data and analyzing student learning outcomes, while Microsoft Power Point is useful in delivering physical education lesson materials.

b. Pedagogical Knowledge (PK)

Pedagogical Knowledge (PK) is the ability of teachers to design and manage

learning. The Pedagogical Knowledge (PK) studied is teacher knowledge in developing learning tools in the form of RPP, teacher knowledge about learning models, methods, assessment techniques, and classroom management. The PK ability of physical education teachers can be seen from the Lesson Implementation Plan (RPP) that is made and used when teaching. Teachers are required to understand how students build knowledge and acquire skills, and how students develop their minds to be able to think critically and creatively. For this reason, teachers need knowledge about cognitive and social learning theories and theories of student development. As expressed by one of the teachers, N. Komariah, S.Pd when interviewed: "Before teaching, we as teachers must first understand the material, after that we make the class as comfortable as possible, with good and fun classroom management and learning methods. For example, we make it with games or others. So there must be adjustments first with the students. We as teachers must be creative and innovative in choosing teaching and learning methods so that children also understand better".

In physical education learning, to manage the class during the learning

process, namely by enlivening the learning atmosphere so that it remains conducive and not boring by applying various learning methods, so that later it can produce good output for students. In addition, Mr. Dani Ramdani as a physical education teacher also said that; "in managing the class so that children can easily understand physical education material, I usually apply learning methods with media, for example showing learning videos, so that students will better understand the material presented. Also, I apply games at the end of each lesson, this is useful for increasing students' comprehension and critical thinking, this is also included in the learning evaluation that I apply during the teaching process".

Learning media are very diverse and can be utilized, namely, print media, models, graphics, audio, video, multimedia and internet connections or networks that can facilitate and enrich students' knowledge. In this era of the industrial revolution 4.0, teachers are required to think creatively in planning learning, teacher creativity is absolutely needed to be able to change the learning situation to be interesting and effective according to the development of the times.

This is reinforced by observations that can be seen that teachers before learning

begins have prepared materials, lesson plans, syllabus, learning media, and other things that support teaching and learning activities. All of the things that are prepared have the aim of making the learning process in the classroom more focused and running according to the desired goals..

- a) From the explanation above, it can be concluded that there are several components of Pedagogical Knowledge (PK) used by physical education teachers, namely;
- b) a) adjusting teaching styles to different students
- c) b) adjusting teaching based on what students understand or do not understand
- d) c) using various teaching approaches in the classroom (collaborative teaching, direct instruction, etc.)
- e) d) teachers know how to assess student performance in class
- f) e) classroom management.

c. Content Knowledge (CK)

Content Knowledge (CK) is knowledge about what material will be delivered by a teacher. Teachers master the teaching material that will be delivered with the latest references and are able to connect it to the environment around the students. A teacher must be able to master

the material being taught so that learning activities run effectively and conducively. This is also in accordance with what was explained by the teacher, Mrs. N. Komariah, S.Pd, when interviewed, namely; "before teaching, every teacher must master the material as much as possible, because good mastery of the material will be seen from the way it is delivered in class. Teachers also use various reference sources in explaining the material so that teachers have sufficient knowledge when explaining the material to students".

This knowledge and mastery of the material is related to the teacher's ability to convey the concept of the subject matter being discussed. Each teacher has a different way of conveying the concept of the material being discussed. However, in general, teachers deliver the material according to the objectives to be achieved. When interviewed, Lidya, a student in Ciputat District, said; "I prefer teachers who deliver the material flexibly, and always have ideas. For example, in the delivery interspersed with jokes but seriously, it usually makes students enjoy and will be easier to grasp the material, besides that, as a student, I am more interested in learning methods that use PPT, videos, and even direct practice in

the field ". Good delivery of material by teachers can be seen in the way they explain the subject matter being discussed and provide examples of images and even videos to make it easier for students to understand the explanation given. Also, teachers also conduct questions and answers to provide stimulation so that students are able to think. In addition, Mr. Dani Ramdani also added an explanation that; "The method of delivering physical education material that I have applied so far is more towards learning videos and direct practice, because physical education has a lot of material that must be done through observation, both in the field and outside the classroom. Things like that are able to sharpen students' mindsets because they learn and apply what they learn directly". Learning videos are considered fun and do not make students feel bored in learning, thus increasing students' learning motivation. By implementing practice and videos, the learning process becomes more interesting and can increase students' learning motivation. Students feel that the methods applied by the teacher attract their attention so that students can focus on the material given by the teacher.

The statements in the interview were reinforced by the results of observations

that had been made, that the learning media used by teachers in the learning process must be mature. Also, teachers also practice directly about physical education learning to students. Thus, to make it easier for students to understand physical education material, teachers and students practice directly in the field and in the classroom.

From the informant's statements above, it can be concluded that the Content Knowledge (CK) of physical education teachers is :

- a) Teachers' knowledge of mastering the material is quite good. This can be seen from the delivery of material that is quite clear, detailed, and easy to understand.
- b) Teachers' knowledge related to the material to be delivered using various methods, one of which is field practice and using video and PPT media.

Thus, the TPACK ability of physical education teachers in Ciputat District can be said to be quite good because teachers understand and have TPACK abilities to provide effective learning and maintain sustainable learning activities. As well as teachers integrating technology into teaching materials, adapting learning strategies, developing skills, using

technology to develop collaboration and communication, and developing skills in teaching based on data. In this case, the TPACK abilities possessed by physical education teachers are classified into several points, including ;

- a) Physical education teachers in Ciputat sub-district have implemented hardware in the form of LCD, laptops, computers, which are used in the teaching and learning process to provide an understanding of physical education material. Also, teachers apply Microsoft Word and Microsoft Excel to obtain student learning outcomes, while PPT functions to present physical education material.
- b) Good teacher delivery in facilitating students during the learning process, and is supplemented with examples that can be easily understood by students. Also, students' thinking skills in solving problems given by teachers.
- c) Understanding and mastery of material that must be possessed by a teacher. This can be seen when delivering material that is quite clear, detailed, and easy to understand. Also, teacher knowledge is interrelated with the material to be delivered using various methods, one

of which is field practice and the use of video and PPT media.

In implementing TPACK, teachers must also understand and use information and communication technology (ICT) in the learning process to improve the quality of teaching and learning.

2. Obstacles and Efforts of Physical Education Teachers in TPACK-Based Physical Education Learning.

In this TPACK-based physical education learning, there are also several obstacles in its implementation which are reviewed from various aspects, these obstacles arise along with the implementation of TPACK in the physical education learning process, this is also in line with what was conveyed by Mr. Dani Ramdani, S.Pd that TPACK-based learning does not always run smoothly, as explained, namely; "Several teachers in Ciputat have implemented TPACK-based learning, but yes, everything does not go smoothly. There are still many who do not really understand TPACK, this is also influenced by several internal and external factors".

Pada observasi serta wawancara conducted, several obstacles were found in the implementation of TPACK-based

physical education learning for physical education teachers in Ciputat, namely the researcher found that not all teachers understand the learning models that vary and are relevant to the needs of students, students in Ciputat sub-district are not yet accustomed to learning models that require them to play an active role in the learning process, lack of use of TPACK by teachers. When teaching TPACK-based learning is very minimally carried out by teachers, as well as the selection of appropriate teaching media by teachers.

The thing that is an effort to answer and overcome the obstacles in the implementation of TPACK has also been answered by Mr. Dani Ramdani, S.Pd, that; "despite all the obstacles that exist, we always try to solve these obstacles. What we have done so far is the selection of TPACK-based teaching aids and media that are in accordance with the characteristics of students, such as using slide show learning media that are designed attractively and using video learning media. As well as, developing a kurmer teaching module with activities that are centered on students, movement activities that foster student activity in the learning process".

The interview also revealed that the limited ability to apply technology to learning can be one of the reasons for the hampering of TPACK competency in learning. So teachers need to learn and improve skills related to TPACK in physical education learning.

DISCUSSION

Based on the theory of Koehler & Mishra, TPACK is a framework for teachers in integrating technology in learning. Teachers in the Ciputat sub-district have implemented TPACK in the physical education learning process, in accordance with the findings and existing theories, the TPACK concept used is Technology Knowledge (TK), Pedagogical Knowledge (PK), and Content Knowledge (CK).

First, reviewed from the results of observations on teachers in the Ciputat sub-district have utilized existing technology such as hardware and software. The hardware used in the smooth learning process is LCD and laptop. While the software used is in the form of supporting applications for students' academic needs such as power point, Microsoft Word, Microsoft Excel, and others. Technology in the learning system is useful for making it easier for

teachers to convey material information to students, because all students can see the information presented by the teacher via laptop and LCD. Also, the application of software is very influential in making lesson plans, assignments, learning materials, or assignment materials and evaluation results.

This is in line with Padmavathi's theory which states that TK is the ability to use various technologies, both hardware and software, from simple to digital. (Laely Armiyati and Habib Miftahul Facurozi, 2022) Also, the challenge for teachers today is to develop technological skills to learn how to integrate new technologies into the learning process. (Jordan & Dinh, 2012).

Second, based on the theory contained in PP Number 74 of 2008 concerning Teachers with the findings that in the application of pedagogical knowledge, it includes knowledge of student character, classroom management, and the process of assessing learning outcomes. Teachers adjust their teaching style to students based on what students understand or do not understand, carry out classroom management, conduct learning evaluations, and use various teaching approaches in the classroom (collaborative teaching, direct

instruction, etc.). This is also in line with Shulman's Theory which emphasizes that Pedagogical Knowledge (PK) is related to the ability to manage the teaching and learning process.

Third, seen from the theory contained in PP No. 74 of 2008, that professional teacher competence is the ability of teachers to master knowledge in the fields of science, technology, art and culture that they teach, which at least includes mastery of subject matter broadly and deeply in accordance with the content standards of the educational unit program, subjects and groups of subjects to be taught, concepts and methods of relevant scientific, technological or artistic disciplines that conceptually cover or are coherent with the educational unit program, subjects, groups of subjects to be taught. for example, knowledge of class management, task management, preparing learning plans, implementing learning and evaluating learning outcomes.

This is in line with the findings during observations of teachers in Ciputat District that teachers' knowledge related to the material to be delivered uses various methods, one of which is field practice and using video or PPT media.

Teachers must master the subject matter being taught and develop the material. (Suryadi and Aguslani Mushlih, 2019).

MGMP PJOK in Ciputat District is one of the organizations that has a vision, namely to excel in achievements in the field of science and technology. However, in the process, not everything runs smoothly in order to realize the vision that has been built. By realizing this vision, one of them is by implementing TPACK. When viewed from the results of observations of the implementation of TPACK in physical education teachers in Ciputat District, it can be said that it has been running but not optimally, because there are still teachers who do not understand technological developments and still maximize providing understanding to students by explaining directly using whiteboard media. Another obstacle that was also found in the field was the lack of selection of the right method in the learning process.

TPACK memiliki beberapa shortcomings that become obstacles in its implementation, including: technological advances that continue to develop are a challenge for educators in implementing the TPACK framework that focuses on the combination of content, pedagogy,

and technology; internet connection and technical problems, a creative and wise educator to deal with situations when technology cannot function properly; and provide meaningful assignments, before using technology in learning an educator must ensure that the material to be delivered can be understood by students with the help of technology, not just focusing on how to use technology. (Taopan, et al., 2020).

In addition to the existing obstacles, according to the theory that has been explained, there are advantages, namely a holistic approach to teaching, this combines three key elements; technology, pedagogy (teaching strategies), and lesson content. This allows teachers to design a more integrated and effective learning experience. One of the efforts made in the field to overcome these obstacles is by selecting TPACK-based teaching aids and media that are in accordance with the characteristics of students, such as using attractively designed slide show learning media and using learning video media. This is also in accordance with the findings during the implementation of observation and interview activities with physical education teachers in Ciputat District, various efforts were made in line

with the TPACK theories that have been applied, namely the use of technology, adjustments to learning in the classroom, and various learning programs that have been prepared.

CONCLUSION

Based on the results of interviews with respondents, this research can be concluded as follows :

1. Analysis of Technological Pedagogical Content Knowledge (TPACK) in Improving Digital Competence of Physical Education Teachers in South Tangerang City using several methods, namely ;
 - a) For Technology Knowledge (TK) includes teachers in Ciputat sub-district who have implemented hardware and software used in the teaching and learning process to provide an understanding of physical education material.
 - b) For Pedagogical Knowledge (PK) includes good teacher delivery in facilitating students during the learning process, and is supplemented with examples that can be easily understood by students.
 - c) For Content Knowledge (CK) includes understanding and mastery of material that must be

possessed by a teacher. This can be seen when delivering material that is quite clear, detailed, and easy to understand.

2. In TPACK for teachers in Ciputat sub-district, especially for physical education teachers, various obstacles that occur to teachers in Ciputat sub-district, one of which is the lack of utilization of TPACK by teachers, as well as the selection of appropriate teaching media to minimize TPACK learning in class by teachers. The characteristics of students are used to answer various obstacles that exist with teaching aids and TPACK-based media, can also use learning videos in the form of slide shows to attract students' interest.

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