Teachers' Perceptions of Using Pedagogic Content Knowledge Technology in the Teaching of Physical Education

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Abstract

Advancement in technology is something that cannot be avoided in human life. This research is descriptive research with mixed methods of sequential explanation. This design is carried out to explore a research phenomenon involving several data sources. This research aims to evaluate which parts are still obstacles for physical education teachers in using technology in physical education learning. The results of this study indicate differences in the TC domain (Technological Content) in the TC domain; there are differences in the average results of each group, followed by the post hoc test and the Tukey test. The average difference was found between the 1-7 year group and the 29-year-old group. 35 years old, the lowest average score in the group is 29-35 years old, and the highest is 22-28 old

I. Introduction

In the era of the industrial revolution, generation 4.0 was marked by the development of digital systems and various kinds of innovations that came from the 4.0 era, among others, such as the Internet of Things (internet for everything), Artificial Intelligence (artificial intelligence), Big Data (large amounts of data). (Cropley, 2020) where the benefit is to improve the quality of human life. In this 4.0 era, two groups were found to use technology (Autry & Berge, 2011) stating that technology users were divided into two groups, namely "Digital Natives" groups who intensively use technology in their daily lives, both at work, study, or just looking for the desired information called the "Digital Immigrant" group where this group is just getting used to using technology in their daily lives.

The development of technology in the 4.0 era has an impact on various sectors of human life, one of which is the impact on the education sector. There have been changes in education in the 20th and 21st centuries. In 20th Century Education, education focuses on children's information sourced from books. While the era of 21st Century Education focuses on all ages, every child is a learning community; learning is obtained from various sources not only from books but from the internet, various technology & information platforms, and curriculum developments globally; this is in line with the Vision Indonesian Education in 2035 Build the Indonesian people to become excellent lifelong learners, continue to develop, prosper, and have noble character by cultivating Indonesian cultural values and Pancasila (Kemdikbud, 2020) where in the future the learning process delivered by teachers will use an educational platform technology-based national Teachers in the 4.0 century must have life skills in the 21st century, have leadership skills, digital literacy,

communication, emotional intelligence, entrepreneurship, global citizenship, team working and problem-solving. To address the challenges and harness the opportunities offered by digital technologies during this crisis, participants shared a concern to recognize and protect digital rights in particular around the areas of privacy and inclusion (Hariati, 2021). This can be interpreted as internet users in Indonesia belongs to the category of digital natives group (Gunawan, 2020). The use of digital technology worldwide is increasing, especially since the COVID-19 pandemic in early 2020 (Yugo, 2021).

Given that Physical Education is known as a unique field of study because it is a socially constructed learning activity and movements that occur in humans are subject to learning in Education Physical (Stidder, 2019) with the characteristics of physical education, it is necessary to involve technology in every learning process; there are many kinds of technology that physical education teachers need to know.

II. Research Methods

This research is a descriptive type of research with mixed methods sequential explanatory where this design is carried out to explore a research phenomenon that involves several data sources. This explanatory sequential design relies on quantitative data that is fully supported by qualitative data that aims to achieve the interests or objectives of a study (Creswell, 2003). In this study, the quantitative data used was the TPACK questionnaire by conducting a survey, which according to (Ponto, 2015). Survey research is defined as gathering information from a sample of individuals through their responses to a question given by the researcher. From research through this questionnaire, it will produce numbers that are processed with statistics. This TPACK questionnaire uses a Likert scale.

This study aims to determine how the perception of physical education teachers in using pedagogical content knowledge technology in teaching physical education is based on where the teacher teaches, and the length of time the teacher teaches
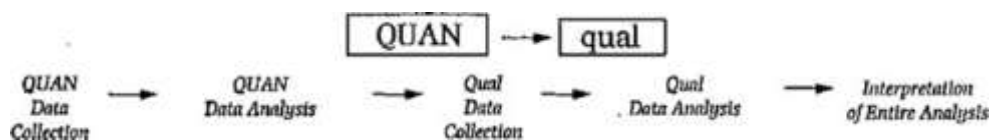

Figure 1. *Research Design (Mixed Methods) Sequential explanatory (Creswell, 2003)*

The data collection method in this study used a questionnaire containing statements that were relevant to the research objectives. The statement items of each number in the questionnaire were arranged in a common and logical manner. This is by way of the researcher distributing the questionnaire personally to the sample in question and waiting for the results of the questionnaire to be filled out by the teachers. Before asking respondents to fill out a questionnaire and be involved in this study, the researcher asked for permission and willingness to participate in this study. Next, an interview session was conducted between the researcher and the research respondents.

III. Discussion

3.1 Results
To find out the measurement results in this study, it will be processed with a statistical approach, in order to know the results of the answers from this study. Collecting data by tests and interviews. The results in this study can be explained as follows:

The research began with distributing questionnaires to 26 Pjok teachers in SMA Negeri in Cimahi City, the percentage of responses can be seen in the diagram below:
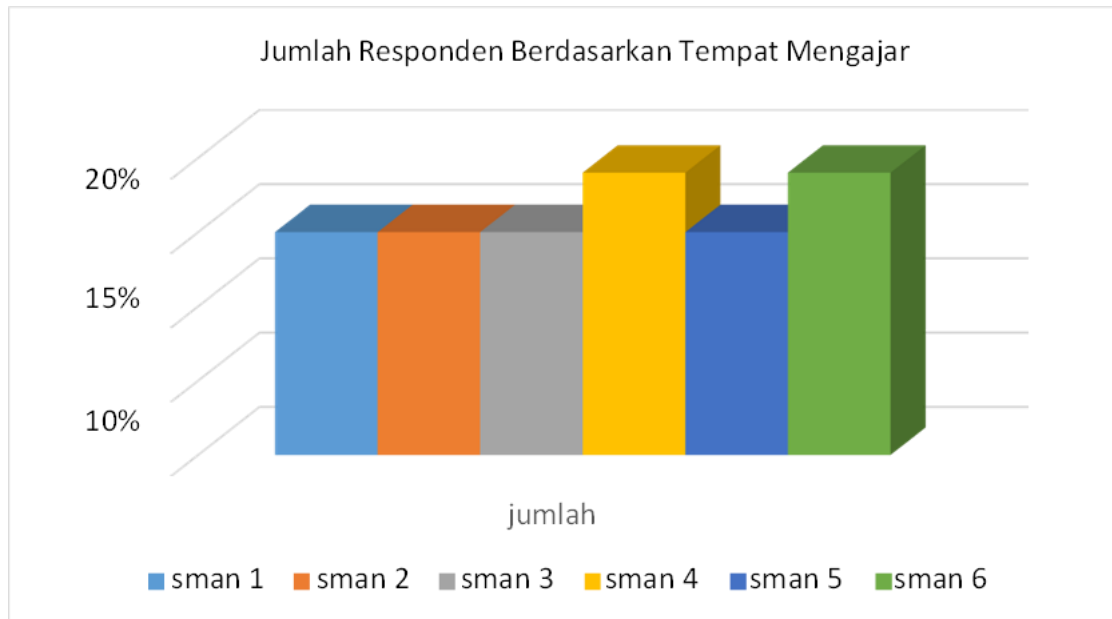

Figure 2. Diagram of the Number of Research Respondents by Place of Teaching

From the diagram above, it can be seen that the number of respondents in this study were from 6 different schools with a percentage of Sman 1 Cimahi as much as 15% (4 people) Sman 2 Cimahi 15% (4 people) Sman 3 Cimahi 15% (4 people) Sman 4 Cimahi 19 %(5 people) Sman 5 Cimahi 15% (4 people) and Sman 6 Cimahi 19% (5 people) where the total number is 26 Pjok Teachers of SMA Negeri Cimahi City.
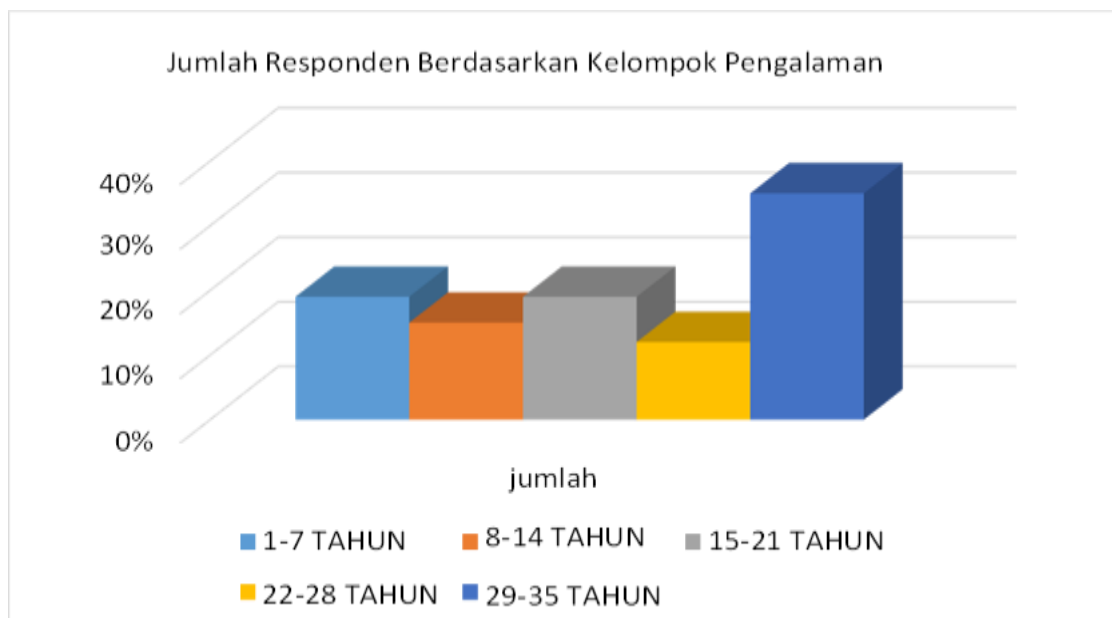

Figure 3. Diagram of the Number of Research Respondents Based on Teaching Experience

From the diagram above it can be seen that the 29-35 group occupies the first position with the number of respondents 35% (9 people) followed by the 15-21 year old group 15% (5 people) and 1-7 years 15 % (5 people) then group 8-14 years 15% (4 people) and group 22-28

years 12% (3 people). The explanation of the diagram above explains the number of respondents based on the length of teaching experience of all teachers from each school.
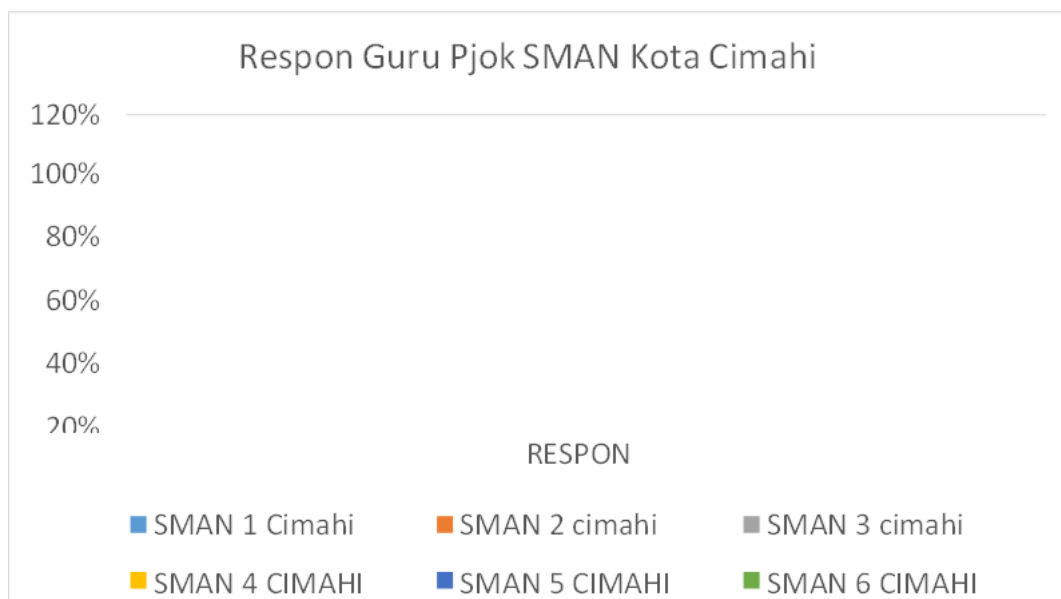

Figure 4. *Response Diagram of Pjok SMAN Teachers in Cimahi City against TPAC Research*

From the diagram above, it can be concluded that from the 6 schools totaling 26 respondents, all gave good responses and were willing to cooperate in answering the questionnaires and questions in the interview sessions given. All teachers from these 6 schools gave a positive response because these 26 teachers are aware that TPACK is a skill that every teacher must have and understand in teaching in the 4.0 era of the 21st century. The questionnaire in this research consisted of 7 domains, namely Technological Content (7 items), Content Knowledge (5 items), Pedagogical Knowledge (3 items), Pedagogical Content Knowledge (3 items), Technological Content Knowledge (4 items), Technological Pedagogical Knowledge (3 items), Technological Pedagogical Content Knowledge (8 items) with descriptive results as follows:

Table 4. Results of Descriptive Analysis of Questionnaire

Domain of TPACK	Mean	SD	3,43
TECHNOLOGICAL CONTENT	0,54	0,32	solve
my technical problems myself	3.88	0.97	
2. I can learn technology easily.	3.85	1.03	
3. I keep up with technology that is new and important	4.42	0.63	
4. I spend a lot of time with technology	3.23	1.25	
5. I know there are many types of technology	4.27	0.71	
6 I can solve my own technical problems	3.46	0.93	
7. I have had many opportunities to work with different technologies	4.00	0.68	
CONTENT KNOWLEDGE	4.00	0.44	0.492
8. I have sufficient knowledge about knowledge and movement skills	4,23	0,64	

9. I have sufficient knowledge about active participation and healthy living	4,31	0,72	
10. I have a kinesthetic way of thinking and relate to movement	4,31	0 ,61	
11. I follow various paths and strategies to improve my professional development in the field of physical education	4.31	0.72	
12. I know how to measure student achievement in grade	4.35	0.55	
PEDAGOGICAL KNOWLEDGE	4.3	0.57	0 ,76
13. I can adapt my teaching method to what is understood and not understood understand students	4,5	0.50	
14. I can adapt my teaching method to various types of learning	4.35	0.55	
15. I can measure what students have learned in various ways	4.31	0.61	
PEDAGOGICAL CONTENT KNOWLEDGE	4 ,12	0.10	1

From the results of the analysis above, it was found that the highest score was in the Pedagogical Knowledge domain with an average value of 4.30 standard deviation of 0.57 where the statement item was "I can adjust my teaching method with what is understood and not understood students" with an average score of 4.50. Then, in the next order, there is the Technological Pedagogical Knowledge domain with an average value of 4.29 standard deviation of 0.06, the third order is in the Technological Content Knowledge domain with an average value of 4.15 and a standard deviation of 0.15, fourth in the Pedagogical Content Knowledge domain with an average value. the average is 4.12 and the standard deviation is 0.10 in the fifth order of the Technological Pedagogical Content Knowledge domain with an average value of 4.07 and a standard deviation of 0.23, then the sixth rank of the Content Knowledge domain with an average value of 4.00 standard deviation of 0.44 then seventh place is in the Technological Content domain with an average value of 3.43 and a standard deviation of 0.54.

a. Assumption Test
1. Normality

Test Normality test is used in this study to determine whether the data in this study are normally distributed or not. Decision making in the normality test is if the value of Sig (Significance) > 0.05, it can be said that the data is normally distributed, if the value of Sig (Significance) < 0.05, it can be said that the data is not normally distributed. The results of the analysis in this study will be presented in the following table:

Table 5. Normality Test Based on Place of Teaching

DOMAIN	TEACHING EXPERIENCE	MEAN	Normality	Conclusion
TC	1-7 YEARS	31.40	0.49	Normal
	8-14 YEARS	31.00	0.06	
	15-21 YEAR	28.80	0.05	
	22-28 YEARS	31.00	1.00	

DOMAIN	TEACHING EXPERIENCE	MEAN	Normality	Conclusion
	29-35 YEARS	26.78	0.15	
CK	1-7 YEARS	21.20	0.45	Normal
	8-14 YEARS	23 ,50	0.19	
	15-21 YEARS	21.40	0.82	
	22-28 YEARS	23.00	1.00	
	29-35 YEARS	20.33	0.35	
DOMAIN	TEACHING EXPERIENCE	MEAN	Normality	Conclusion
PK	1-7 YEARS	13.60	0 ,86	Normal
	8-14 YEARS	13.75	0.86	
	15-21 YEARS	14.20	0.31	
	22-28 YEARS	13.67	1.00	
	29-35 YEARS	13.69	0.33	
DOMAIN	TEACHING EXPERIENCE	MEAN	Normality	Conclusion
PCK	1-7 YEARS	13.60	0.86	Normal
	8-14 YEARS	14.00	0.68	
	15-21 YEARS	13.00	0.11	
	22-28 YEARS	14.00	1.00	
	29-35 YEARS	13.62	0, 05	
DOMAIN	TEACHING EXPERIENCE	MEAN	Normality	Conclusion
TCK	1-7 YEARS	17.60	0.31	Normal
	8-14 YEARS	17.50	0.19	
	15-21 YEARS	16.60	0.49	
	22-28 YEARS	18.67	0.63	
	29 -35 T YEAR	14.89	0.19	
DOMAIN	TEACHING EXPERIENCE	MEAN	Normality	Conclusion
TPK	1-7 YEARS	13.00	0.11	Normal
	8-14 YEARS	13.00	0.68	
	15-21 YEARS	11.40	0.25	

Based on the results of the analysis described the table above shows that all domains and groups of years of teaching produce a sig (significant) value > from a value of 0.05, which means that it can be concluded that all data are normally distributed.

2. Homogeneity

Test the homogeneity test aims to test the data to ensure that it comes from a homogeneous population. The decision making on the homogeneity test is that if the Sig value (significance) is < 0.05, it can be concluded that the data is not homogeneous, but when type Sig (significance) > 0.05, it can be concluded that the distribution of data in a study is homogeneous. The results of the homogeneity test analysis are described in the following table:

Table 6. Homogeneity Test Based on Teaching Place (School)

place group (School)		df 1	df 2	sig	conclusion
	Levene Statistic				
TC	2,374	5	20	1.278	Homogeneous
CK	1.119	5	20	0.312	Homogeneous
PK	Teaching	5	20	0.382	Homogeneous
PCK	0.511	5	20	0.765	Homogeneous
TCK	0.499	5	20	0.773	Homogeneous
TPK	1.667	5	20	0.189	Homogeneous
TRACK	0.724	5	20	0.613	Homogeneous

Table 7. Homogeneity Test Based on Teaching

experience Years of teaching experience		df 1	df 2	sig	conclusion
	Levene Statistics				
TC	1.203	4	21	0.339	Homogeneous
CK	1.711	4	21	0.185	Homogeneous
PK	2,280	4	21	0.095	Homogeneous
PCK	1,845	4	21	0.158	Homogeneous

Based on the results of the homogeneity test as presented in table 4.8, it was obtained in all domains, both in the group where teaching and the year of teaching, the Sig value > 0.05, it can be concluded that the data has homogeneous or the same variance.

3. Hypothesis Testing

Where the ANOVA hypothesis test is a statistical hypothesis test that can draw conclusions on

based	.						
	In	data	or	statist ical	variance	inferenti al	hypoth esis
groups1	32.25	23.00	13.74	13.75	18.25	13.00	34.25
SMAN 2	27.25	19.50	13.00	13.75	13.50	11.25	26.25
SMAN 3	29.50	20.75	14.00	13.50	16.75	13.25	33.05
SMAN 4	27.20	20.00	12.40	13.60	15.20	13.20	29.00
SMAN 5	30.50	22.50	14 ,25	13.25	17.75	12.00	35.25
SMAN 6	30.20	23.20	14.60	14.00	18.00	12.40	33.20
sig .	0.243	0.00**	0.02**	0.19	0.08	0.28	0.05*

Decision Making Anova Test:

H0 : There is no significant difference between 1 school and other schools.

H1 : There is a significant difference between school 1 and other schools.

Information:

• Sig > than 0.05 Then H0 is accepted (So there is no significant difference between 1 school and other schools)

• Sig < than 0.05 Then H0 is rejected (So there is a significant difference between 1 school and other schools)

The results of the ANOVA test analysis on the table for the group where there is teaching (school) obtained the sig value for the TC domain is 0.243 where this value is > from the 0.05 value, the average for the TC domain in each school is the same. Furthermore, in the CK domain the sig value obtained is 0.00 where this value is <0.05, it can be concluded that the average of the six schools has a significant difference. The next domain is PK which gets a sig value of 0.02 <0.05, so it can be concluded that in this PK domain there is a significant difference from each school. In the PCK domain, the sig value of 0.19> 0.05 means that the average value for the PCK domain in each school is the same. In the fifth domain, namely TCK, the sig value is 0.08 > 0.05, so the average value in the TCK domain from each school is the same. In the TPK domain, a sig value of 0.28> 0.05 was obtained, then the average value in the TPK domain from each school was the same. Furthermore, the last TPACK domain obtains a sig value of 0.05 > 0.05, so the average value in the TPACK domain from each school is the same.

4. Post hoc Test

This post hoc test is conducted to find out which groups have different average values in this study, the ANOVA test has been carried out and there are differences in the domain groups, therefore it is necessary to carry out further tests, namely the post hoc test as follows:

Table 8. Post Hoc Domain TC Test Based on the Place of Teaching

Post Hoc Test Technological Content						
	SMAN 1	SMAN 2	SMAN 3	SMAN 4	SMAN 5	SMAN 6
SMAN 1		0.804	0.804	0.440	0.266	0.804

	SMAN 1	SMAN 2	SMAN 3	SMAN 4	SMAN 5	SMAN 6
SMAN 2	0.993		1	0.902	0.92	0.804
SMAN 3	0.993	1		0.219	0, 92	0.902
SMAN 4	0.440	0.993	0.993		0.997	0.996
SMAN 5	0.266	0.920	0.920	0.997		1
SMAN 6	0.902	0.219	0.902	0.996	1	

From the results of the Post Hoc Test table above shows that all TC sig domain values are greater than 0.05, it can be concluded that the test value The TC domain in each school is the same, so the difference in the average results of the TC domain test scores is not significant.

Table 9. Post Hoc Domain CK Test Based on the Place of Teaching

Post Hoc Test Content Knowledge						
	SMAN 1	SMAN 2	SMAN 3	SMAN 4	SMAN 5	SMAN 6
SMAN 1		0.001	1	0.002	0.724	1
SMAN 2	0.001		0.001*	0.987	0.019	0.000*
SMAN 3	1	0.001*		0.003*	SMAN	0.830 0.997
4	0.002	0.987	0.003		0.047	0.001*
SMAN 5	0.724	0.019	0.83	0.047		0.526
SMAN 6	1	0.000*	0.997	0.001*	0.526	

From the results of the Post Hoc Test table above, there is a sig value between the comparison of Sman 1 and SMAN 2, which is 0.001 < 0, 05 which can be concluded that there is a significant difference, then Sman 1 and Sman 4 are 0.002 < 0.05 then there is a significant difference, then Sman 2 and Sman 3 are 0.001 < 0.05 then there is a significant difference, Sman 2 and Sman 6 are 0.00 <0.05 then there is a difference, Sman 3 and Sman 4 are 0.003 <0.05 then there is a significant difference, Sman 4 and Sman 6 are 0.001 < 0.05 then there is a significant difference, then Sman 5 and Sman 2 are 0.019 < 0 0.05 then there is a significant difference.

Table 10. PK Domain Post Hoc Test Based on Teaching Place PK

Post Hoc Domain Test						
	SMAN 1	SMAN 2	SMAN 3	SMAN 4	SMAN 5	SMAN 6
SMAN 1		0.041*	0.497	0.026*	0.861	0.726
SMAN 2	0.041*		0.692	1	0.323	0.363
SMAN 3	0.497	0.692		0.625	0, 497	0.996
SMAN 4	0.026*	1	0.625		0.257	0.292
SMAN 5	0.861	0.323	0.986	0.257		1

5						
SMAN 6	0.726	0.292	0.363 0.996	1	From	

The results of the post hoc test analysis above, there is a sig value of Sman 1 with Sman 4 0.026 < 0.05 then there is a significant difference, then Sman 2 with Sman 1 sig value of 0.041 < 0.05, then there is a significant difference.

Table 11. PCK Domain Post Hoc Test Based on the Place of Teaching

PCK Domain Post Hoc Test						
	SMAN 1	SMAN 2	SMAN 3	SMAN 4	SMAN 5	SMAN 6
SMAN 1		0.542	0.99	0.487	0.766	0.956
SMAN 2	0.542		0.332	1	0.990	0.925
SMAN 3	0.99	0.332		0 ,28	0,542	0,812
SMAN 4	0,487	1	0,28		0,998	0,906
SMAN 5	0,766	0,99	0,542	0,998		0,993
SMAN 6	0,956	0,925	0,812	0,906	0,993	

From the results of the PCK domain test, no sig value was found for each school that had a sig value < of 0.05, so it can be concluded that in this PCK domain there is no significant difference from each school or the scores produced in this PCK domain are the same.

Table 12. TCK Post Hoc Test Based on the place of teaching

Post Hoc Domain TCK test						
	SMAN 1	SMAN 2	SMAN 3	SMAN 4	SMAN 5	SMAN 6
SMAN 1		0.178	0.969	0.471	1	1
SMAN 2	0.967		0.545	0.231	0.988	0.140
SMAN 3	0.969	0.545		0.909	0.961	0.471
SMAN 4	4	0.967	0.909		0.569	0.409
SMAN 5	1	0.569	0.231 0.988	1		SMAN
6	1	0.140	0.961	0.409	1	

From the results of the TCK domain test, no sig value was found for each school that had a sig value < 0.05, so it can be concluded that there is no difference in the TCK domain. The significance of each school or the scores produced in this TCK domain are the same.

Table 13. TPK Domain Post Hoc Test Based on the Place of Teaching

Post Hoc Test Domain TPK						
	SMAN 1	SMAN 2	SMAN 3	SMAN 4	SMAN 5	SMAN 6
SMAN 1		0.981	1	1	0.993	0.66

	0.981		0.981	0.996	1	0.263
SMAN 2	0.981		0.981	0.996	1	0.263
SMAN 3	1	0.981		1	0.993	0 ,66
SMAN 4	1	0.996	1		0.999	0.457
SMAN 5	0.993	1	0.993	0.999		0.328
S MAN 6	0.66	0.263	0.660 0.457	0.328	From	

The results of the TPK domain test, no sig value was found for each school with a sig value < 0.05, so it can be drawn the conclusion in this TPK domain is that there is no significant difference from each school or the scores produced in this TPK domain are the same.

Table 14. Post Hoc Test Domain TPACK Based on teaching place

Post Hoc Test Domain TPACK						
	SMAN 1	SMAN 2	SMAN 3	SMAN 4	SMAN 5	6
SMAN 1		0.095	1	0.884	0.998	0.997
SMAN 2	0.095 0.169		0.976	0.434	0.041*	0.168
SMAN 3	1	0.973		0.169	SMAN	1
SMAN4	0,884 0,434	0,973	0,656		0,985	SMAN
5	0,998	0,041*	0,976	0,656 0,941		SMAN
6	0,997 0,168	1	0,985	0,941	From	

The results of the Post Hoc test for the TPACK domain, it was found that the sig value at Sman 5 and Sman 2 with a Sig value of 0,05, it can be concluded that there is a significant difference in the average value in this TPACK domain.

Furthermore, because there are several domains that have a significant average difference, it will be continued on the Tukey HSD (Honestly Significant Difference) Test or the Honestly Significant Difference Test, the results of the Tukey test are as follows:

Table 15. Tukey Domain CK

Test Group Teaching Places Tukey Domain CK Test				
Tukey HSD				
school	N	Subset for alpha = 0.05		
		1	2	3
sman 6	5	12.2		
sman 1	4	12.5		
sman 3	4	12.75		
sman 5	4	14.25	14.25	
sman 4	5		18	18
sman 2	4			18.75
Sig.		0.54 496	0.0528 01	0.9879 14

From the results of the Tukey test analysis above in the subset column 1 there are Sman 6, Sman 1, Sman 3 and Sman 5, then in the subset column 2 there are Sman 5, Sman 4, in the subset column 3 there are Sman 4 and Sman 2, it can be concluded that the difference in the average CK domain for the place of teaching group occurs in Sman4, Sman 2, Sman 6, Sman 1, Sman 3 and Sman 5 schools, so all schools have significantly different average scores.

Furthermore, to discuss research question number 1, regarding how physical education teachers perceive the use of the TPACK framework in teaching physical education, the author uses the interview method with 10 interview participants which will be explained in:

the	following	tablerelated
Problems in applying technology in learning	"The biggest problem for teachers in applying technology in learning is, there is still a lack of renewable knowledge regarding the application of technology in learning" (Tatang) "Lack of guidance from competent resources regarding what TPACK is and the application of technology in effective learning appropriate" (Yuli) "We, as senior teachers, feel the difficulty is not in the capacity of the equipment because the school has been very supportive in the facilities, the problem that senior teachers feel is regarding the management of the use of technology devices so that they are still capable of loading n proper learning" (Yayah)	Kindergarten, TPK, TCK, TPAC K

In this study indicates that the perception of a teacher at Sman 1 Cimahi, Sman 5 Cimahi and Sman 6 Cimai has higher results compared to Sman 2 Cimahi, Sman 3 Cimahi and Sman 4 Cimahi. However, when viewed from the difference in teaching experience groups, groups of 8-14 years have good grades compared to other groups of years of teaching experience. Other results in this study revealed that of the seven domains tested on 26 Pjok teachers throughout Cimahi City, the domain Pedagogical Knowledge, Technological Pedagogical was obtained. Qualitatively, some Pjok Cimahi City teachers said in interviews that they were familiar with the use of technology, they knew what technology was and the role of technology as a tool to solve problems in learning. In the interview it was found that one of the schools in Cimahi City has an independent learning platform that can only be accessed by students and teachers at the school, with this platform it is expected to support learning for students, and can increase teacher creativity in delivering learning materials as seven domains in TPACK can be fulfilled in a learning process. It was found again in the results of interviews where schools have a vision, mission and school strategy that want to improve teacher professionalism through the use of ICT in learning, overall Public High Schools in Cimahi City have good infrastructure in supporting technology-based learning processes, but most of them stated in interviews that they still the lack of supporting human resources to integrate technology in accordance with the TPACK framework into the learning process, several ways and efforts were made to introduce the use of technology in the learning process in accordance with the TPACK framework in the Pjok teacher working group in Cimahi City and small groups namely MGMP PJOK subjects in their respective schools always provide technical guidance regarding learning based on the TPACK Framework, but still Pjok Teachers in Cimahi City feel they need technical guidance from

parties who understand more about technology-based learning gi according to the Track framework of more competent resources.

Although the level of knowledge about technology-based learning is in accordance with the TPACK Framework, most Pjok teachers in Cimahi City feel that technology is useful for improving a teaching, further than that other benefits of technology can stimulate students' thinking in the classroom, the other is with technology. can establish good collaboration with fellow Pjok teachers both at school and between schools. Another Pjok teacher's expression also stated that the advantage of technology in the Pjok learning process is that it can facilitate interesting learning situations, create a critical learning climate always apply technology in it in order to keep pace with the times.

The Pjok teacher who was interviewed mentioned about collaboration between other Pjok teachers in technology integration that collaboration between teachers can help each other in improving skills and knowledge as well as self-efficacy in integrating technology, collaboration between fellow teachers is related to the domain of Kindergarten Technological Knowledge, In this interview session, there is hope for Pjok teachers in Cimahi City is there is guidance from competent resources in the use of technology based on the TPACK framework, so that it has a better impact on teachers, students and the school environment, because recalling physical education subjects has different characteristics. In contrast to other subjects, it is important to remember that physical education is a holistic learning, where the movement of the human being is the teaching material in learning.

3.2 Discussion

Perceptions of Pjok State Senior High School teachers throughout the City of Cimahi showed a positive perception of the TPACK framework, this was shown from the results of descriptive calculations that of the 26 total respondents gave good responses and were willing to cooperate in answering the questionnaires and questions in the interview sessions given. All teachers from these 6 schools gave a positive response because these 26 teachers are aware that TPACK is a skill that every teacher must have and understand in teaching in the 4.0 era of the 21st century. Through interviews, it was found that Pjok State High School teachers in Cima City obtained learning content that was renewable and applied to student learning, besides that in interviews it was found that students became more creative by using technology-based learning platforms, although sometimes the teachers themselves still felt left behind from the participants.

Furthermore, in the TC, PCK, TCK, TPK domains, there are no significantly different average values. The lowest value for the TC domain was obtained by Sman 5 and 6; the highest was obtained by Sman 1 Cimahi. The lowest value for the PCK domain was obtained by Sman 3 Cimahi City, the highest value for Sman 5 Cimahi. In the TCK domain, the lowest score was obtained for Sman 2 in Cimahi City, the highest value for Sman 1 in Cimahi City and for Sman 6 in Cimahi City. In the TPK domain, the lowest value was obtained by Sman 2 Cimahi City and the highest value was obtained from Sman 6 Cimahi City.

There are differences in the results of the Track test for Pjok Sman teachers in Cimahi City based on teaching experience

IV. Conclusion

This study can conclude several conclusions, the perception of Pjok Sman teachers in Cimahi City shows a good perception by showing the cooperative attitude of all Pjok teachers in welcoming this TPACK research, in addition, Pjok Sman teachers in Cimahi City can fill out questionnaires with applicable regulations. In the results of the interview they said how important and influential technology is in education, the application of technology in learning

in accordance with the TPACK framework really supports the teacher's task to deliver material and far from that technology changes all difficult paradigms to become more concise and easy to understand in a material content. Based on school groups, there are differences in the CK (Content Knowledge) and PK (Pedagogical Knowledge) domains, based on teaching experience, there are differences in the TC and TPACK domains. Although there is a low score in the TPACK domain for Pjok State Senior High School teachers in Cimahi City, they say that the importance of using technology in learning that is adapted to the TPACK framework, they are teachers who understand and are aware of the benefits and uses of technology in learning, but are still lacking in integrating it accordingly with the TPACK framework.

The conclusion of this study provides a significant and deep insight regarding the perceptions of Pjok teachers at the State High School level in Cimahi City about technology integration through the TPACK framework (technology knowledge, pedagogical knowledge, content knowledge, content pedagogical knowledge, technological content knowledge and technology content). The quantitative and qualitative findings reveal the advantages and disadvantages of technology integration in accordance with the TPACK framework. Barriers to be minimized and profits to be increased.

References

Adhabi, E., & Anozie, CB (2018). Literature Review for the Type of Interview in Qualitative Research, (September 2017). https://doi.org/10.5296/ije.v9i3.11483

Association for Physical Education. (2015). Health Position Paper. Physical Education Matters. Association for Physical Education, (October). Retrieved from http://www.afpe.org.uk/physical-education/wp-content/uploads/afPE_Health_Position_Paper_Web_Version2015.pdf

Autry, AJ, & Berge, Z. (2011). Digital natives and digital immigrants: Getting to know each other. Emerald Insight, 43(7), 460–466. https://doi.org/10.1108/00197851111171890

Baek, J.-H., Keath, A., & Elliott, E. (2018). Physical Education Teachers' Technology Practices and Challenges. International Journal of Human Movement Science, 12(2), 27–42. https://doi.org/10.23949/ijhms.2018.08.12.2.2

Baek, JH, Jones, E., Bulger, S., & Taliaferro, A. (2018). Physical education teacher perceptions of technology-related learning experiences: A qualitative investigation. Journal of Teaching in Physical Education, 37(2), 175–185. https://doi.org/10.1123/jtpe.2017-0180

Baraka, M. (2014). Gagne's Nine Events of Instruction in Teaching-Learning Transaction: Evaluation of Teachers by High School Students in Musoma- Tanzania. International Journal of Education and Research, 2(7), 189–206.

Creswell, J. w. (2003). Qualitative, quantitative, and mixed methods approaches. (Sage, Ed.) (second). Sage.

Cropley, A. (2020). Creativity-focused Technology Education in the Age of Industry 4.0.

Creativity Research Journal, 00(00), 1–8. https://doi.org/10.1080/10400419.2020.1751546

Ervin, SR (2011). The Relationship between Teacher Collaboration and Student Achievement.

Ganot, A., Junius, S., & Shonfeld, M. (2011). Technology Integration in Physical Education. Society for Information Technology & Teacher Education International Conference, 2011(1), 2451–2454. Retrieved from https://www.learntechlib.org/p/36677/

Garland, R. (1991). The mid-point on a rating scale: Is it desirable. Marketing Bulletin, 2(1), 66–70.

Gawrisch, DP, Richards, KAR, & Killian, CM (2020). Integrating Technology in Physical Education Teacher Education: A Socialization Perspective. Quest, 72(3), 260–277. https://doi.org/10.1080/00336297.2019.1685554

Graham, BCR, Burgoyne, N., Cantrell, P., Smith, L., Clair, LS, & Harris, R. (2009).

Gunawan, G.G., and Sulaeman, M. (2020). Determining Factors in the Use of Digital Marketing and Its Effect on Marketing Performance inthe Creative Industriesin Tasikmalaya. Budapest International Research and Critics Institute-Journal (BIRCI-Journal) Vol 3 (3): 2543-2550.

Hariati, P. (2021). Implementation of Digital Literacy toward Pandemic Situation. Budapest International Research and Critics Institute-Journal (BIRCI-Journal) Vol 4 (2): 2920-2926.

Measuring the TPACK Confidence of Inservice Science Teachers, 53(5).

Johnson, TG, & Turner, L. (2016). The Physical Activity Movement and the Definition of Physical Education. Journal of Physical Education, Recreation & Dance, 87(4), 8–10. https://doi.org/10.1080/07303084.2016.1142192

Juniu, S. (2011). Pedagogical Uses of Technology in Physical Education. Journal of Physical Education, Recreation & Dance, 82(9), 41–49. https://doi.org/10.1080/07303084.2011.10598692

Kemdikbud. (2020). Peta Jalan Pendidikan Indonesia 2020-2035. Kemdikbud, 1–7478

Knowledge, T., & Naspe. (2008). National Initial Physical Education Teacher Education Standards. Teacher, 1–34.

Koehler, MJ, & Mishra, P. (2006). Technological Pedagogical Content Knowledge: A Framework for Teacher Knowledge PUNYA MISHRA. Teachers College Record, 108(6), 1017–1054. Retrieved from http://one2oneheights.pbworks.com/f/MISHRA_PUNYA.pdf

Krause, JM, & Lynch, BM (2018). Faculty and student perspectives of and experiences with TPACK in PETE. Curriculum Studies in Health and Physical Education, 9(1), 58– 75. https://doi.org/10.1080/25742981.2018.1429146

Lachman, SJ (1997). Learning is a process: Toward an improved definition of learning.

Journal of Psychology: Interdisciplinary and Applied, 131(5), 477–480. https://doi.org/10.1080/00223989709603535

Lan, P., & Young, S. (1996). I We ml tedmk transfer exam at tedmlegy co t level: a case study in China, 16(6), 277–286.

Lince, R. (2016). Strategi Peningkatan Profesionalisme Guru Dalam Menghadapi Tantangan Di Era Digital. Prosiding Temu Ilmiah Nasional Guru (Ting), VIII (November), 164–179.

Retrieved from http://repository.ut.ac.id/6486/1/TING2016ST1-15.pdf

Maeng, JL, Mulvey, BK, Smetana, LK, & Bell, RL (2013). Preservice Teachers ' TPACK : Using Technology to Support Inquiry Instruction. https://doi.org/10.1007/s10956-013-9434-z

Messina, L., & Tabone, S. (2012). Integrating Technology into Instructional Practices Focusing on Teacher Knowledge. Procedia - Social and Behavioral Sciences, 46(2011), 1015– 1027. https://doi.org/10.1016/j.sbspro.2012.05.241

Molenda, alan januszewski / michael. (2008). Educational Technology A Definition With Commentary. Routledge.

Moller, L., Jones, G., & Shelton, K. (2004). Association for Educational Communication and Technology Conference on Emerging Technologies and Theories for Teaching and Learning.

Muhaimin, M., Habibi, A., Mukminin, A., & Saudagar, F. (2019). Journal of Technology and Science Education A SEQUENTIAL EXPLANATORY INVESTIGATION OF TPACK :, 9(3), 269–281.

Mulenga, IM (2018). Conceptualization and Definition of a Curriculum. Journal of Lexicography and Terminology, 2(2), 1–23.

OECD 2030. (nd). Making Physical Education Dynamic and Inclusive for 2030. Ponto, J. (2015). Understanding and Evaluating Survey Research.

Qiong, OU (2017). A Brief Introduction to Perception, 15(4), 18–28. https://doi.org/10.3968/10055

Reeves, TC, & Hall, A. (2006). How do you know they are learning?: the importance of alignment in higher education, 2(4), 294–309.

Schmidt, DA, Baran, E., Thompson, AD, Mishra, P., Koehler, MJ, & Shin, TS (2009). Technological pedagogical content knowledge (Track): The development and validation of an assessment instrument for preservice teachers. Journal of Research on Technology in Education, 42(2), 123–149. https://doi.org/10.1080/15391523.2009.10782544

Semiz, K., & Ince, ML (2012). Pre-service physical education teachers' technological pedagogical content knowledge, technology integration self-efficacy and instructional technology outcome expectations. Australasian Journal of Educational Technology, 28(7), 1248–1265. https://doi.org/10.14742/ajet.800

SHAPE. (2017). National Standards for Initial Physical Education Teacher Education. SHAPE America. America: SHAPE.

Shukla, S. (2020). Concept of population and sample, (November).

Shulman, L. (1987). Knowledge and Teaching: Foundations of the New Reform. Harvard Educational Review, 57(1), 1–22.

Siedentop, D. (2002). Content Knowledge for Physical Education, (April 1989), 368–377.

Smart, R. (nd). Research into the Effects of Teacher Collaboration on Student Achievement. Soppeng, S., & Hajar, ST (2019). Faktor-Faktor Yang Mempengaruhi Pembelajaran Kewirausahaan.

Stidder, G. (2019). What is Physical Education? Sport, Education and Society, 53–70. https://doi.org/10.4324/9781315772080-5

Tongco, MDC (2007). Purposive Sampling as a Tool for Informant Selection, 158, 147–158.

Undang-Undang-Nomor-14-Tahun-2005.pdf. (nd). Undang-Undang Republik Indonesia. (2003).

United Nations educational, scientific, cultural organization. (2011). UNESCO ICT Competency Framework for Teacher. In Microsoft (Ed.), ICT for Teacher (2nd ed., pp. 2–94). France.

UU No 3 Tahun 2005. Undang-Undang Republik Indonesia Nomor 3 Tahun 2005 Tentang Sistem Keolahragaan Nasional Dengan, Presiden RI 1–53 (2005).

Van Laar, E., van Deursen, AJAM, van Dijk, JAGM, & de Haan, J. (2020).

Determinants of 21st-Century Skills and 21st-Century Digital Skills for Workers: A Systematic Literature Review. SAGE Open, 10(1). https://doi.org/10.1177/2158244019900176

Vern, T. (1985). The Cultural Environment of International Business. In The Cultural Environment of International Business. Institute Of Technology.

Vinceno, P., Getty, I., John, FS, Hinz, H., & Etal. (2006). Britannica encyclopedia concise. York, N., Wiley, J., & Karson, M. (1967). Journal of the American Statistical Association

Handbook of Methods of Applied Statistics. Volume I: Techniques of Computation

Descriptive Methods, and Statistical Inference. Volume II: Planning of Surveys and Experiments. (July 2015). https://doi.org/10.1080/01621459.1968.11009335.