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SWOT Analysis of Technological Pedagogical Content Knowledge (TPACK) Implementation on Geography Learning

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Abstract. Technological Pedagogical Content Knowledge (TPACK) is a learning design model that considers the relevance between material, pedagogy, and learning technology. This model is suitable to be applied to Geography subjects, but the question arises: is there enough media and learning tools available in schools to carry out TPACK-based geography learning? This study uses a survey method with a study population of all geography teachers in 3 (three) districts / cities in West Java Province. Data was analyzed using the SWOT approach. The results showed that the main weakness of the implementation of TPACK was the limitation of learning tools / media, and geographic subjects still grouped in the social sciences so that they received less attention from the government. In addition, the threat is a ban from the government to implement the TPACK model because it is slightly different from the applicable learning process standards. Based on the above conditions, a solution that is considered effective is conducting further research, namely identifying the tools and geography learning media needed and developing a systematic TPACK-based scientific learning model / strategy

1. Introduction

The 2013 curriculum in force in Indonesia recommends that classroom learning pay attention to the trend of 21st Century learning that develops 4 C (Critical thinking, Communication, Collaborative, and Creativity)[1]; and ICT skills. Both of these demands are challenges that need to be responded immediately and planned. One of the efforts is to develop adaptive learning models in accordance with the characteristics of subjects, such as Technological Pedagogical Content Knowledge (TPACK). TPACK is a learning design model that combines material understanding, pedagogy, and learning technology that produces more integrated slices. These slices are Technological Pedagogical Knowledge (TPK), Technological Content Knowledge (TCK), and Pedagogical Content Knowledge (PCK), and all of them are incorporated in the slices of Technological Pedagogical Content Knowledge (TPACK) [2][3][4][5]. This research is an initial step to explore opportunities and challenges if TPACK-based geography learning is applied in Indonesia.

Initially, the term PCK was more popular than TPACK. At that time, the PCK framework was about pedagogical knowledge, learning practices, and learning planning, as well as appropriate methods to teach a material [6]. Furthermore, it is developed more operationally, which is considered as a teacher's knowledge in providing teaching situations to help students understand the content of science [7]. In fact, before using the term TPACK, many experts mentioned the term TPCK without letter "A".

However, because it was difficult to pronounce, it was changed to the term TPACK [8]. The study of TPACK continues and finally emerging new terms such as ITC-TPCK and TPACK-XL are interdisciplinary ideas in the basic framework of TPACK [9]

In geography subjects, the application of the TPACK model is very urgent because almost all material requires technology to explain the object of geographic studies that range from small objects to very large sizes; from narrow areas to global regions. Geographical material characteristics that require understanding concepts, processes, interactions, and their impacts in real life require tools, media, and technology that are not just two dimensions but three-dimensional media in the form of reflexes and simulators.



The urgency of this research is to be able to meet the various needs demanded in the policies that apply both to meet the demands of the standard process (scientific learning) and to improve student achievement. In addition, TPACK-based learning will provide greater opportunities for the growth and development of character education for students through the concept of learning effects. Geography learning that is directed to foster patriotism [10], will be more effective if the teacher is able to apply TPACK-based scientific learning.

2. Methods

This study uses survey methods and delphy. In the survey activities, researchers distributed questionnaires to teachers in three districts / cities, namely Bandung City, Sumedang Regency, and Karawang Regency. The research subjects that were visited were 54 people through two stages of activity. The first stage is filling out the questionnaire by respondents and the second stage through focus discussion (Focus Group Discussion). Data collection was conducted at three different times, namely in Bandung City, Sumedang Regency, and Karawang Regency. Data is processed using descriptive methods, tabulation and graphics. Data is analyzed using the SWOT approach so that problems are seen and easy to submit recommendations.

3. Results and Discussion

3.1. Availability of Geography Learning Tools and Media

In the context of the TPACK model, the availability of tools and learning media has a very vital position. The availability of tools and media in schools that are owned by teachers, students, and schools can be used as an illustration of the existence or absence of opportunities for teachers to implement TPACK in every classroom learning. The following is the data of the research results

3.1.1. Ownership of Geography Subject Text Books

Based on the results of the study, the ownership of the Text Book is quite high, both teachers and students already have textbooks. This is a strength to take advantage of opportunities in the implementation of the TPACK design model in geography learning at the high school level in Indonesia.

Table 1. Ownership of Geography Subject Text Books

No	Amount of Ownership	Ownership by Teachers		Ownership by Student	
		F	%	F	%
1	There is no	1	1,85	2	3,70
	1 - 2	30	55,56	37	68,52
	3 - 4	9	16,67	7	12,96
	5 - 6	4	7,41	0	-
	> 6	10	18,52	8	14,81
		54	100,00	54	100,00

Based on table 1, the teacher has a textbook between 1-2 books (55.56%), and students also have a textbook 1-2 books (68.52%). Some teachers have more textbooks, 3 - 4 different titles (16.67%).

3.1.2. Ownership of Geography Subject Enrichment Books

Furthermore, the study traces the property of enrichment books that have to do with geography. The enrichment book is an important book to deepen the material and is a form of high motivation to study geography. The following are data obtained from research.

Table 2. Ownership of Geography Subject Enrichment Books

No	Amount of Ownership	Ownership by Teachers		Ownership by Student	
		F	%	F	%
2	There is no	4	7,41	12	22,22
	1 - 2	35	64,81	30	55,56
	3 - 4	6	11,11	6	11,11
	5 - 6	4	7,41	1	1,85
	> 6	5	9,26	5	9,26
		54	100,00	54	100,00

Table 2 shows that Accuracy of data from the research results above is only in the column by the teacher, while the books carried out by students are only in the form of respondents and are not sufficiently valid data. This is recognized because respondents who submitted research subjects were only teachers and students as respondents. However, give the initial information that students have enrichment books that may be read in class often.

3.1.3. Ownership of Reference Books (Teacher Readings) and LKS (For Students)

Ownership of reference books owned by teachers is also quite significant. The reference book is a sourcebook whose substance of discussion focuses on one field of science (in this case geography). The book discusses a wide range of topics, the order of material and the structure of textbooks arranged based on the logic of content (content-oriented). The following is the research data obtained. Based on table 3, teachers have reference books between 1 - 2 (38.89%) and those that have 3 - 4 (25.93%). The ownership of LKS is quite good (57.41%) even though there is 31.48% without LKS.

Table 3. Ownership of Reference Books (teacher reading) & LKS (for Students)

No	Amount of Ownership	Ownership by Teachers		Ownership by Student	
		F	%	F	%
3	None	2	3,70	17	31,48
	1 - 2	21	38,89	31	57,41
	3 - 4	14	25,93	5	9,26
	5 - 6	9	16,67	0	-
	> 6	8	14,81	1	1,85
		54	100,00	54	100,00

3.1.4. Internet Access Ownership

Furthermore, the opportunity that is quite promising for the implementation of geography learning by using the TPACK model is internet access. Internet access, not only obtained through personal smartphones but also from wifi that they can access such as at school and in their homes.

Table 4. Internal Access Ownership

No	Amount of Ownership	Ownership by Teachers		Ownership by Student	
		F	%	F	%
4	None	3	5,56	9	16,67
	1 - 2	34	62,96	35	64,81
	3 - 4	6	11,11	7	12,96
	5 - 6	3	5,56	0	-
	> 6	8	14,81	3	5,56
		54	100,00	54	100,00

Based on table 4, almost all teachers and students have internet access, only around 5.56% and 16.67% do not have internet access. The data above is quite accurate because when compared with the results of other studies it is also consistent. The following are data on tools and media that can be provided by the school.

3.1.5. Ownership of Tools and Geography Learning Media Owned by Schools

The tools and geography learning media surveyed are only samples that range from those commonly owned by schools and the tools and media needed but are quite rare in schools.

Table 5. Availability of Tools and Learning Media in Schools

		Not available		Bad condition		Good condition	
		F	%	F	%	F	%
1	Atlas	1	1,85	2	3,70	51	94,44
2	Internet access	2	3,70	2	3,70	50	92,59
2	Globe	2	3,70	0	-	52	96,30
3	Desktop computer	2	3,70	0	-	52	96,30
4	Laptop	2	3,70	0	-	52	96,30
5	Indonesian map	3	5,56	7	12,96	44	81,48
6	LCD	7	12,96	2	3,70	45	83,33
7	Compass	16	29,63	1	1,85	37	68,52
8	Rock Comparator	16	29,63	4	7,41	34	62,96
9	Topographic maps	30	55,56	5	9,26	19	35,19
10	GPS	38	70,37	1	1,85	15	27,78
11	Aerial Photos	39	72,22	2	3,70	13	24,07
12	Mockup	39	72,22	6	11,11	9	16,67
13	Props of Learning	41	75,93	4	7,41	9	16,67
14	Stereoscope	46	85,19	3	5,56	5	9,26

Based on table 5, tools and learning media that are generally owned by schools are atlases, Internet access, Globe, Desktop Computers, Laptops, Indonesian Maps, and LCDs while others are rarely owned by schools. Tools that are rarely owned by schools are equipment that is based on modern technology and specifically for geography learning. The equipment is difficult to obtain by schools because the image of geography subjects is a subject in the Social Sciences family. It is this presumption that does not look as important to the practice of geography. The visualization of tool ownership and Geography Owned by schools is shown in figure 1

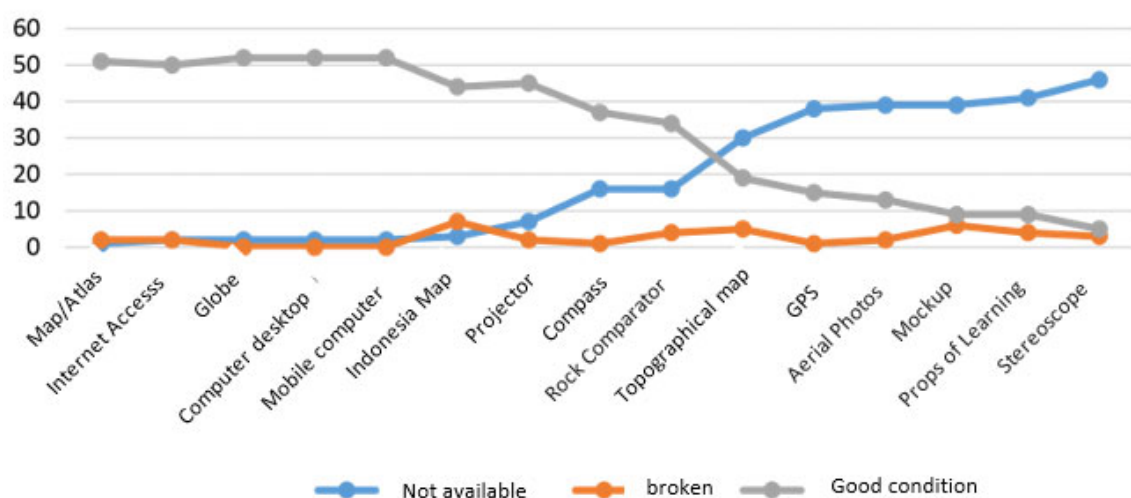


Figure 1. Graph of Tool Ownership and Geography Learning Media Owned by Schools

3.2. Teacher's Perception of the TPACK Implementation Barriers

Next the researcher traced the teacher's perceptions of the obstacles to the implementation of TPACK in school. Learning barriers are perceptions of respondents as measured by teachers' insights and knowledge, which of course, is following their respective capacities and competencies. The following is a general description of the types of barriers to geography learning.

Table 6. The barrier in Geography Learning in Schools

No	Percentage	Limitation of learning media	Weak on subject material proficiency	Weak on implementation of Scientific approach proficiency	Limitation of Learning Source	Limitation of Learning equipment
1	< 20 %	11	24	10	18	17
2	21 - 40%	9	18	27	18	20
3	41 - 60 %	22	6	14	11	9
4	61 - 80%	8	5	3	5	6
5	> 80%	4	1	0	2	2
Total		54	54	54	54	54

The data above can be read that the obstacles caused by the limitations of the learning media are quite high because they range from 41% - 60%. From the aspect of teacher competence, it is not too descriptive. Although there are obstacles from the aspect of material mastery and implementation of scientific learning but only between 20 - 41%, this means that the teacher has limitations in mastering the material and methodology of learning; therapy is not carried out as an obstacle if implementing learning with the TPACK model. From the aspect of learning resources and the limitations of learning facilities, it is also not an obstacle.

Table 7. SWOT Analysis

SWOT	Strengths	Weakness
Opportunity	Teachers and students have textbooks and have internet access capabilities. In addition, the teacher's age is dominated by young age and thus it will be easier to develop the TPACK model by the teacher	The limitations of learning tools / media in schools and geographic subjects are still grouped in the social sciences so that they receive less attention from the school. The step that is considered to be able to overcome weaknesses is to foster teacher competence so that they can take advantage of suggestions and infrastructure as tools / media in schools
Treat	The threat identified in geography learning with the TPACK model is the prohibition from the school supervisor (education office) to implement learning innovations such as TPACK because it is not in accordance with the standards of the educational process. The strategy is to integrate the two into a TPACK-based scientific learning model	Weaknesses and threats have been explained, the strategy considered relevant is conducting further research with two targets, namely (1) identifying the tools and media needed in TPACK and (2) developing TPACK-based scientific learning models / strategies.

Interim analysis of the results of the above research is that the limitation of tools and learning media is the most important thing. While mastery of material and methodology is not an obstacle because when viewed from the age, the teacher turns out to be relatively young and productive. Their teaching

experience under 20 years is 97 people from 121 respondents (80.17%). The SWOT Analysis is described in table 7

4. Conclusions

The results of the analysis show that the limitations of learning media in schools are still extreme, besides that in curriculum policy in Indonesia, geography is always grouped in the social sciences so that they receive little attention from the school. Both are weaknesses that have an impact on the threat of prohibiting the use of TPACK models in the classroom because they are not following the standard policies of the education process. Based on the above conditions, the strategy considered relevant is conducting further research that targets two things, namely (1) identifying and proposing learning tools and media needed in the context of TPACK and (2) developing TPACK-based scientific learning models/strategies more systematic.

References

- [1] Applied Education Systems.____. What Are the 4 C's of 21st Century Skills? Available on <https://www.aeseducation.com/careercenter21/what-are-the-4-cs-of-21st-century-skills>
- [2] Cox, S., & Graham, C. R. (2009). "Diagramming TPACK in practice: using and elaborated model of the TPACK framework to analyze and depict teacher knowledge". *TechTrends*, 53(5), 60– 69.
- [3] Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: a framework for teacher knowledge. *Teachers College Record*, 108(6), 1017-1054.
- [4] Shulman, L. S. (1986). "Those who understand: knowledge growth in teaching". *Educational Researcher*, 15(2), 4–14.
- [5] Koehler, M. J., Mishra, P., Ackaoglu, M., & Rosenberg, J. M. (2013). *The Technological Pedagogical Content Knowledge Framework for Teachers and Teacher Educators*. Commonwealth Educational Media Centre for Asia.
- [6] Abbit, J. T. (2011). Measuring technological pedagogical content knowledge in preservice teacher education: A review of current methods and instrument. *Journal of Research on Technology in Education*, 43(4), 281-300.
- [7] Lougran, J., Amanda, B. & Pamela, M. (2012). *Understanding and developing science teacher's pedagogical content knowledge* (2nd ed). Rotterdam: Sense Publisher AW.
- [8] Chai, C. -S., Koh, J. H. -L., & Tsai, C. -C. (2013). A Review of Technological Pedagogical Content Knowledge. *Educational Technology & Society*, 16 (2), 31–51.
- [9] Koh, JHL; Chai, CS; and Tay. LY (2014). TPACK-in-Action: Unpacking the contextual influences of teachers' construction of technological pedagogical content knowledge (TPACK). *Article. Computers & Education*. Volume 78, September 2014, Pages 20-29
- [10] Yani, A. 2015. Menakar Kurikulum Geografi 2013 Dalam Pengembangan Nilai Patriotisme. Bandung. Artikel. MIMBAR, Vol. 31, No. 2 (Desember, 2015)