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Technology, Pedagogy and Content Knowledge Model for Increasing Civic Education Teacher's Competencies in the Classroom

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ABSTRACT

The Covid-19 pandemic has required students to learn from home, leading teachers to adapt and develop online learning that integrates technological, pedagogical, and content knowledge (TPACK). This study aimed to investigate the knowledge and skills of social studies teachers at the middle and high school levels in transmitting TPACK. This study used a quantitative approach with a survey method, with a sample of 117 respondents from middle and high schools. The results showed no differences in skills between genders in using TPACK. Secondly, TPACK is the ability to integrate technology, pedagogy and content processing components, but the results show that teachers do not fully own these components.

Keywords: *TPACK, Civic Education, learning*

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INTRODUCTION

Teaching is a complex and multifaceted profession that requires a range of knowledge, skills, and attitudes. These include both personal qualities and professional competencies and the ability to continuously and consistently apply these in practice. As a profession, teaching also plays a vital role in the transmission of values and the creation of an ideal society (Keow & Chan, 2015). The importance of effective teaching cannot be overstated, as it plays a central role in shaping the next generation of leaders, thinkers, and citizens (Allan & Charles, 2015). Therefore, it is essential that those who choose to pursue teaching as a career are well-prepared and continuously develop their skills and knowledge in order to provide the highest quality education to their students.

A well-established theory in education suggests that effective teaching requires a combination of content knowledge, pedagogy and an understanding of the intersection between these two areas, known as Pedagogical Content Knowledge (PCK) (Baran et al., 2011; Koehler et al., 2013). However, with the rapid advancement of technology in the 21st century, new theories have emerged emphasizing the importance of teachers having a deep understanding of how to integrate technology into their teaching, including Technological Content Knowledge (TCK), Technological Pedagogical Knowledge (TPK), and Technological Pedagogical Content Knowledge (TPACK) (Graham et al., 2012; Hofer et al., 2011). These theories suggest that in today's modern classroom, it is crucial for teachers to have a strong foundation in both traditional teaching practices and the integration of technology to effectively educate their students.

The integration of technology in education has become increasingly important, particularly in the wake of the COVID-19 pandemic which has necessitated the shift towards online and blended learning (Başaran & Hussein, 2023). While these new forms of education offer numerous benefits, it is crucial to consider the ability of educators to effectively integrate technology into their teaching practices. Research on the technology integration skills of Indonesian teachers is therefore necessary in order to understand the current state of technology use in education in the country.

The shift towards blended learning has been a trend in Indonesia following the COVID-19 pandemic (Dhawan, 2020). However, Indonesian teachers have struggled to effectively integrate technology into their teaching practices, resorting to simply assigning tasks for students to complete online or directing them to watch television for instruction (Arsendy et al., 2020). In order to address these issues and improve the quality of education in Indonesia, it is essential to conduct further research on the technology integration skills of Indonesian teachers.

Several studies have demonstrated the effectiveness of technology as a teaching tool in enhancing student engagement and interest in learning (Elshaikh et al., 2018; Gon & Rawekar, 2017; Komalasari & Rahmat, 2019). In civic education classes, the use of multimedia such as videos, comics, and images has been found to facilitate the discovery of values by students (Komalasari & Rahmat, 2019). The use of chat applications like WhatsApp as a discussion platform in dermatology classes has been shown to increase student interaction in the learning process (Elshaikh et al., 2018). WhatsApp has been particularly effective due to its mobile nature, which allows teachers to easily provide feedback to students (Bakshi et al., 2019; Kaliyadan et al., 2015). Overall, the incorporation of technology in education has the potential to facilitate the learning process for both teachers and students.

The integration of technology into education has become increasingly important in the 21st century, with the Framework for 21st Century Learning highlighting the use of technology as a tool, process, and resource in modern learning environments. In

order to effectively integrate technology into teaching and learning, it is essential that educators possess the necessary Technology, Pedagogy, and Content Knowledge (TPACK) skills. TPACK has attracted the attention of researchers, this is shown by the publication of 600 publications on the cross-disciplinary Scopus database (Tseng et al., 2022). However, there is a need for further research to be conducted on the technology integration skills of educators in order to better understand and address any challenges or gaps in this area. The importance of TPACK in the effective integration of technology into education and it is therefore necessary to examine the extent to which educators possess these skills (Angraini, 2023; Kereluik et al., 2014). So, this reasearch wants to find out how TPACK skills were comperhanded by civic education teachers. The formulation of the problem is: Is there a significant relationship between TPACK variables? Are there similarities and differences in TPACK skills between men and women?

METHODOLOGY

Population and Sample

This research uses a quantitative approach with a survey method. The survey method is a method that collects data with survey data. The survey method is an investigation conducted to obtain facts from existing phenomena and seek factual information about a particular group or population (Fraenkel et al., 2012). This study involved 20 junior and senior high schools in West Sumatra. The sample of this study was 117 teachers consisting of 22 men and 95 women. These teachers teach in Pancasila and citizenship education, at the junior high school and senior high school levels. The demographic details of the sample are in table 1 as follows:

Table 1. Sample of Demography

Gender	Level		Total
	Primary	Secondary	
Male	12	10	22
Female	61	34	95
Total	73	44	117

Instrument

Measuring the TPACK ability of Civics teachers in West Sumatra, we adopted the TPACK survey instrument developed by Schmid et al. (2020).. The main reason is that the instrument has been validated and constructed 7 TPACK indicators. However, we modified and reduced some complex indicators, such as TCK, PCK, and TPK indicators. The researcher used 4 components of my instrument, namely, TK (Technological Knowledge). PK (Pedgagocal Knowledge), CK (Content Knowledge), and TPACK (Technology, Pedagogy, and Content Knowledge) (Archambault &

Crippen, 2009). The reduction of indicators is because this study will compare TPACK abilities without comparing the wedge instruments. In addition, some questions were modified to be more technically understandable such as the statement "I have the technical skills I need to use technology" to "I am skilled in using video processing software (Example: Filmora/windows movie maker/camtasia/kinemaster studio)". The modification of this question aims to follow the trend among Indonesian teachers who have been briefed on creating short application-based videos.

Test the validity and reliability of the data

The instruments were tested for validity and reliability using *Item-rest correlation* and Cronbach's alpha.

Table 2. Item-rest correlation validity test

No.	**Item**	**TK**	**PK**	**CK**	**TPACK**
1	I am skilled at fixing problems that occur on my computer	0.689			
2	I keep up with the latest computer technology and software developments	0.657			
3	I know the types of computer hardware, making it easier for me to learn.	0.614			
4	I am skilled in using video processing software (Example: Filmora/windows movie maker/camtasia/kinemaster studio)	0.628			
5	I am skilled in developing e-module based learning tools (Example: Sigil Software, active presenter, and exelearning etc.)	0.664			
6	I am skilled in using LMS website features (Example: Moodle, Google Classroom, Schoology, Edmodo)	0.695			
7	I am skilled in using presentation applications such as Power Point, Prezzi etc.	0.559			
8	I am skilled in maximizing video meeting features such as Google meets, Microsoft team, Webex and Zoom.	0.600			
9	With technology I can easily evaluate student learning outcomes	0,468			

9	I master pedagogical theories in Civics learning		0.622		
10	The lesson plan uses questions to inspire students to explore a topic.		0.642		
11	The lesson plan thoroughly explains the chosen subject without skipping important details		0.646		
12	The learning process encourages students to ask questions		0.626		
13	I mastered problem solving-based learning		0.554		
14	I have in-depth knowledge of Civics material			0.749	
15	I master the basic concepts of Civics material			0.700	
16	I can explain a phenomenon that is currently hot with the material being discussed.			0.694	
17	I can connect one material with another in Civics material			0.578	
18	I understand how to assess students			0.749	
19	I am skilled in using a variety of assessment methods			0.700	
20	I can adapt to different types of students			0.694	
21	I understand how to choose effective learning approaches to guide students to think in order to improve learning outcomes.				0.664
22	I know how to use technology to improve my understanding of Civics materials.				0.709
23	I am skilled in integrating appropriate learning technologies and approaches to enhance students' knowledge.				0.704
24	I am adaptable in using technology and I continue to learn to maximize the quality of learning.				0.643
25	I can design technology-based learning and integrate it with the Civics learning model.				0.735
26	With technology I can easily evaluate student learning outcomes				0.570

All statements from the distributed instruments were valid with >0.3. However, there are statements with low validity values. For example "With technology I can easily evaluate student learning outcomes" (0.468), "With technology I can easily evaluate student learning outcomes (0.570), and I master problem solving based learning (0.554)". However, these questions are still valid. In addition, the researcher also used Bartlett's test of sphericity and KMO Index calculated with Jamovi software to determine the suitability of factor analysis. The former was significant at the 0.001 level (Chi-square= 1687, df=325) and the latter was 0.902. Both results indicate that the data is suitable for factor analysis.

The research then continued by testing the reliability of each indicator item. Researchers used Jamovi software with the following results:

Table 3. Reliability test alpha cronbach

Dimensions	# of items	Mean	SD	Cronbach' α
TK	9	2,99	0,568	0,878
PK	5	3,34	0,443	0,823
CK	7	3,38	0,414	0,863
TPACK	6	3,24	0,450	0,870

Table. 3 shows that each dimension is reliable so that each instrument can be used anywhere. Table 3 shows that the TK dimension has the smallest average but the highest aplha value.

To answer the research question: is there a significant relationship between TPACK variables? Researchers used the product moment correlation test. Meanwhile, to answer the question: are there similarities and differences in TPACK skills between men and women? and Are there similarities and differences in TPACK skills between junior and senior high school teachers?, researchers used the independent sample t test.

RESULTS AND DISCUSSION

TPACK correlation between variables

Table 4. Relationship between variables

Variables			**Pearson's r**	
Technological Knowledge	-	Pedagogical Knowledge	0.390	***
Technological Knowledge	-	Content Knowledge	0.436	***

Variables			**Pearson's r**	
Technological Knowledge	-	TPACK	0.606	***
Pedagogical Knowledge	-	Content Knowledge	0.662	***
Pedagogical Knowledge	-	TPACK	0.706	***
Content Knowledge	-	TPACK	0.747	***
* p < .05, ** p < .01, *** p < .001				

Table 4 reveals that all variables have significant relationships ($p < 0.001$), although the strength of the relationships differs. Moderate and significant relationships are observed between TK-PK (0.390) and TK-CK (0.436). Previous research supports these findings. TK and PK have a less strong relationship. Other research shows that TK and PK only have r=0.05 (Schmid et al., 2020) and r=0.333 (Luo, 2023). This is due to the fact that teachers' ability to keep up is not accompanied by updates on the use of technology (Castéra et al., 2020).. The TK-CK relationship is also not so strong, for example research by Schmid et al., (2020) found that the value of r=0.05. This is because many teachers have content skills but have not been able to fully integrate technology (Ali, 2023).

Meanwhile, strong and significant relationships are evident in TK-TPACK (0.606) and PK-CK (0.662). Moreover, PK-TPACK (0.706) and CK-TPACK (0.747) exhibit a very strong level of association. Therefore, the findings suggest that the variables have varying levels of strength and significance in their relationships.

TPACK defferences between gender

Table 5 shows the means, standard deviations, t-test results, p-values, and Cohen's d for the four knowledge variables (Technological, Pedagogical, Content, and TPACK) by gender (Male and Female). In TK, the mean scores for males and females were similar (M=23.5), but the standard deviation was higher for females (SD=4.43) than males (SD=3.57), however the t-test results were not significant (t=0.050, p=0.520), and the effect size was small (Cohen's d=0.012).

Table 5. t-test between Gender

Variables	**Group**	**N**	**Mean**	***SD***	***T***	***P***	***Cohen d***
Technological Knowledge	Male	22	23.5	3.57	0.050	0.520	0.012

	Female	95	23.5	4.43			
Pedagogical Knowledge	Male	22	16.2	2.05	1.094	0.862	0.259
	Female	95	16.8	2.25			
Content Knowledge	Male	22	23.0	2.75	1.163	0.876	0.275
	Female	95	23.8	2.93			
TPACK	Male	22	19.0	2.57	0.785	0.783	0.186
	Female	95	19.5	2.73			

Note. For all tests, the alternative hypothesis specifies that group Female is less than group Male. Note. Student's t-test.

On Pedagogical Knowledge, mean scores were slightly higher for females (M=16.8) than males (M=16.2), but the difference was not statistically significant (t=1.094, p=0.862), and the effect size was small to medium (Cohen's d=0.259). For Content Knowledge, women's mean score was slightly higher (M=23.8) than men's (M=23.0), but again the difference was not significant (t=1.163, p=0.876), and the effect size was small to medium (Cohen's d=0.275).

The TPACK results showed that the mean score of female participants was slightly higher (19.5) than that of male participants (19.0). However, the difference in scores was not statistically significant (t=0.785, p=0.783). The effect size, as measured by Cohen's d, was small (Cohen's d=0.186). Although some small differences were observed in the mean scores and effect sizes, overall there were no significant ability gaps in the four knowledge dimensions assessed in this study, despite some small differences in the mean scores and effect sizes.

This finding indicates that there is basically no significant difference in TPACK ability between women and men in all aspects. This result is also in line with the finding that there is no significant difference in TPACK ability among mathematics teachers based on gender (Li, 2023). This study concluded that gender is not an important factor in applying TPACK in learning. English teachers' ability to integrate technology in learning also has no significant difference. (Naing & Wiedarti, 2023).This means that there is already an equalization of technology skills between men and women.

In contrast to this study, other findings indicate that there is a significant difference in TPACK ability between women and men (Castéra et al., 2020; Koh et al., 2014; Liu et al., 2015). Chinese female K12 teachers believe that they are more skillful in applying diverse teaching methods or PCK (Liu et al., 2015). Whereas in Computer-Assisted Education (CAE) teachers, male teachers are more skilled in using technology than female teachers (Baturay et al., 2017). This suggests that there is variation in the relationship between gender and TPACK ability, depending on the context, field of study, and type of teaching studied.

The above research shows that there are variations in the relationship between gender and TPACK ability depending on the context and field of study studied. In some cases, significant differences were found, while in others, no significant differences were found between men and women. Therefore, it is important to consider the specific context and other variables when generalizing such findings.

CONCLUSION

Overall, this study showed that there was no significant difference in TPACK ability between females and males in all aspects assessed. Although there were some small differences in the mean scores and effect sizes, they did not have significant statistical implications. These results are consistent with other studies that found that gender is not an important factor in applying TPACK in math and English learning.

However, it is important to note that these findings are not absolute and there are variations in the relationship between gender and TPACK ability depending on the context and field of study studied. Some previous studies found significant differences between men and women in TPACK ability, depending on the teaching context and the type of technology used.

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REFERENCE

Ali, D. A. (2023). Empirical Research on Technological Pedagogical Content Knowledge (TPACK) Framework in Health Professions Education: A Literature Review. Medical Science Educator, Query date: 2023-06-26 02:37:47. https://doi.org/10.1007/s40670-023-01786-z

Allan, A., & Charles, C. (2015). Preparing for life in the global village: Producing global citizen subjects in UK schools. Research Papers in Education. https://www.tandfonline.com/doi/abs/10.1080/02671522.2013.851730

Angraini, E. (2023). Student Perceptions of a TPACK-Integrated Virtual Classroom for Genetics Instruction. AIP Conference Proceedings, 2569(Query date: 2023-06-26 02:37:47). https://doi.org/10.1063/5.0112442

Archambault, L., & Crippen, K. (2009). Examining TPACK among K-12 online distance educators in the United States. Contemporary Issues in Technology and Teacher Education, 9 (1), 71-88. https://www.learntechlib.org/p/29332/

Arsendy, S., Gunawan, C. J., Rarasati, N., & Suryadarma, D. (2020). Teaching and Learning During School Closure: Lessons from Indonesia. ISEAS Yusof Ishak Institute. http://hdl.handle.net/11540/12448.

Bakshi, S. G., Doctor, J. R., Trivedi, B., Chatterjee, A. S., Thota, R. S., & Jain, P. N. (2019). WhatsApp-based teaching module for acute pain management: A prospective educational project. Canadian Journal of Anesthesia/Journal Canadien d'anesthésie, 66(6), 736–737. https://doi.org/10.1007/s12630-019-01339-2

Baran, E., Chuang, H. H., & Thompson, A. (2011). TPACK: An emerging research and development tool for teacher educators. Turkish Online Journal of Educational …. https://eric.ed.gov/?id=EJ946646

Başaran, S., & Hussein, K. A. (2023). Determinants of University Students' Intention to Use Video Conferencing Tools during COVID-19 Pandemic: Case of Somalia. Sustainability, 15(3), 2457.

Baturay, M. H., Gökçearslan, S., & Sahin, S. (2017). Associations among Teachers' Attitudes towards Computer-Assisted Education and TPACK Competencies. Informatics in Education, 16(1), 1–23.

Castéra, J., Marre, C. C., Yok, M. C. K., Sherab, K., Impedovo, M. A., Sarapuu, T., Pedregosa, A. D., Malik, S. K., & Armand, H. (2020). Self-reported TPACK of teacher educators across six countries in Asia and Europe. Education and Information Technologies, 25(4), 3003–3019. https://doi.org/10.1007/s10639-020-10106-6

Dhawan, S. (2020). Online Learning: A Panacea in the Time of COVID-19 Crisis. Journal of Educational Technology Systems, 49(1), 5–22. https://doi.org/10.1177/0047239520934018

Elshaikh, A., Saeed, O., & El Hag, M. I. (2018). Whatsapp as a supplemental learning tool for pathology. LABORATORY INVESTIGATION, 98, 219–219.

Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2012). How to design and evaluate research in education (Vol. 7). McGraw-hill New York.

Gon, S., & Rawekar, A. (2017). Effectivity of e-learning through WhatsApp as a teaching learning tool. MVP Journal of Medical Sciences, 19–25.

Graham, C. R., Borup, J., & Smith, N. B. (2012). Using TPACK as a framework to understand teacher candidates' technology integration decisions. Journal of Computer Assisted Learning, 28 (6), 530-546. https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1365-2729.2011.00472.x

Hofer, M., Grandgenett, N., Harris, J., & ... (2011). Testing a TPACK-based technology integration observation instrument. Society for Information Technology & Teacher Education International Conference (pp. 4352-4359). Association for the Advancement of Computing in Education (AACE). https://www.learntechlib.org/p/37015/

Kaliyadan, F., Ashique, K., Jagadeesan, S., & Krishna, B. (2015). What's up dermatology? A pilot survey of the use of WhatsApp in dermatology practice and case discussion among members of WhatsApp dermatology groups. Indian Journal of Dermatology, Venereology, and Leprology, 82. https://doi.org/10.4103/0378-6323.171638

Keow, T., & Chan, T. (2015). The Importance of Ethics , Moral and Professional Skills of Novice Teachers. Procedia - Social and Behavioral Sciences, 205(May), 8–12. https://doi.org/10.1016/j.sbspro.2015.09.004

Kereluik, K., Mishra, P., Fahne, C., & Terry, L. (2014). What Knowledge Is of Most Worth: Teacher Knowledge for 21 St Century Learning Abstract. Journal of Digital Learning in Teacher Education, 29(4), 127–140. https://doi.org/10.1093/acprof:oso/9780195335453.003.0003

Koehler, M. J., Mishra, P., & Cain, W. (2013). What is technological pedagogical content knowledge (TPACK)? Journal of Education. https://journals.sagepub.com/doi/abs/10.1177/002205741319300303

Koh, J. H. L., Chai, C. S., & Tsai, C. C. (2014). Demographic factors, TPACK constructs, and teachers' perceptions of constructivist-oriented TPACK. Journal of Educational Technology & Society.

Komalasari, K., & Rahmat. (2019). Living Values Based Interactive Multimedia in Civic Education Learning. International Journal of Instruction, 12(1), 113–126.

Li, M. (2023). Chinese mathematics teachers' TPACK and attitudes toward ICT integration in the post-pandemic era. Eurasia Journal of Mathematics, Science and Technology Education, 19(7), em2301.

Liu, Q., Zhang, S., & Wang, Q. (2015). Surveying Chinese In-Service K12 Teachers' Technology, Pedagogy, and Content Knowledge. Journal of Educational Computing Research, 53(1), 55–74. https://doi.org/10.1177/0735633115585929

Luo, W. (2023). An Exploration of Early Childhood Teachers' Technology, Pedagogy, and Content Knowledge (TPACK) in Mainland China. Early Education and Development, 34(4), 963–978. https://doi.org/10.1080/10409289.2022.2079887

Naing, I. R., & Wiedarti, P. (2023). Scrutinizing EFL Teachers' TPACK Mastery Level in Teaching English Based on Gender and Schools Status Disparities. AL-ISHLAH: Jurnal Pendidikan, 15(2).

Schmid, M., Brianza, E., & Petko, D. (2020). Developing a short assessment instrument for Technological Pedagogical Content Knowledge (TPACK.xs) and comparing the factor structure of an integrative and a transformative model. Computers & Education, 157, 103967. https://doi.org/10.1016/j.compedu.2020.103967

Tseng, J.-J., Chai, C. S., Tan, L., & Park, M. (2022). A critical review of research on technological pedagogical and content knowledge (TPACK) in language teaching.

Computer Assisted Language Learning, 35(4), 948–971. https://doi.org/10.1080/09588221.2020.1868531