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Technology Pedagogical Content Knowledge-based learning model in Citizenship Education courses

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Abstract
This study aims to see the readiness of each educator in using knowledge-based learning models of technological pedagogic content in Civics learning. In this case, educators and lecturers play an important role in controlling the learning situation of technology pedagogic content knowledge, researchers consider one of the most effective learning models to be TPACK. In this study, researchers used quantitative research methods to measure the extent to which the learning model influenced knowledge of technological pedagogic content and the readiness of students to carry out learning in the classroom environment. The results of the study show that the TPACK model is very effective in the learning process, especially in Civics subjects, that incorporating TPACK into teacher preparation and professional development programs can lead to improved teaching practices and student learning outcomes. TPACK has become an increasingly important framework in education, as technology continues to play a greater role in teaching and learning.

Keywords: citizenship education; educator; model; TPACK

Introduction

In the 21st century, educators play pivotal roles and carry significant responsibilities in the advancement and progress of their nations. It is no longer sufficient for teachers and

lecturers to simply have an affinity for children (Naz & Rashid, 2021). To meet the demands of modern education, educators need to possess a diverse knowledge base encompassing academic, pedagogic, social, and cultural aspects and become reflective professionals who can effectively solve problems while aligning with the principles of Pancasila and the 1945 Constitution (Sofyan et al., 2022). Teachers must also stay abreast of the latest developments in the field of education, which constantly evolves with new ideas and concepts for the benefit of students and professionals in the education sector.

One of the innovative ideas to enhance education in the 21st century is to revamp the curriculum development framework by integrating information and communication technology with pedagogical content knowledge in a systematic and structured manner, as proposed DeJonckheere & Vaughn (2019). This integration would enable educators to effectively incorporate modern technological tools and resources into their teaching practices, enhancing the overall quality of education and preparing students for the demands of the digital age.

The idea was first introduced in the research journal by Mishra and Koehler in 2006, titled "Technological Pedagogical Content Knowledge: A Framework for Teacher Knowledge" (Oner, 2020). According to Gyamfi (2020), the framework integrates three main aspects: technology, pedagogy, and content, and Model Technological Pedagogical Content Knowledge is a discipline that involves the appropriate use of technology in effective teaching for knowledge transfer. This integration is expected to be a potent approach to enhancing teachers' competence and effectiveness. Teachers play a crucial role in this integrated effort. The Technological Pedagogical Content Knowledge approach empowers them to master and integrate competencies, knowledge, and teaching techniques, leading to effective, innovative, and improved student learning outcomes (Brinkley-Etzkorn, 2020).

Creating meaningful educational experiences can be achieved by optimizing the competence of teachers, lecturers, and other educators. Teachers, lecturers, and school principals need to align their commitment to improving the quality of education in schools and colleges (Iwu et al., 2021). The commitment from educators serves as a bridge to enhance their abilities, as teachers and lecturers strive to improve their competence in every learning opportunity within the school environment. Principals have a managerial function in schools, including managing natural and human resources, regulations, and financing to support teacher competency development (Gorski & Dalton, 2020; Khan et al., 2020). Principals can formulate policies for human resource development, particularly in building teacher capacity, such as enhancing information technology capabilities, developing teaching materials, improving teacher management, and providing online learning support facilities such as Wi-Fi and data quotas.

The nation's social capital can be seen in the spirit of "gotong royong," or mutual cooperation, which has been proven during the COVID-19 pandemic, from individuals to communities, and even corporate philanthropy (Arpannudin et al., 2021) Currently, learning is being conducted online due to the pandemic, and the importance of technology in education has been emphasized even more.

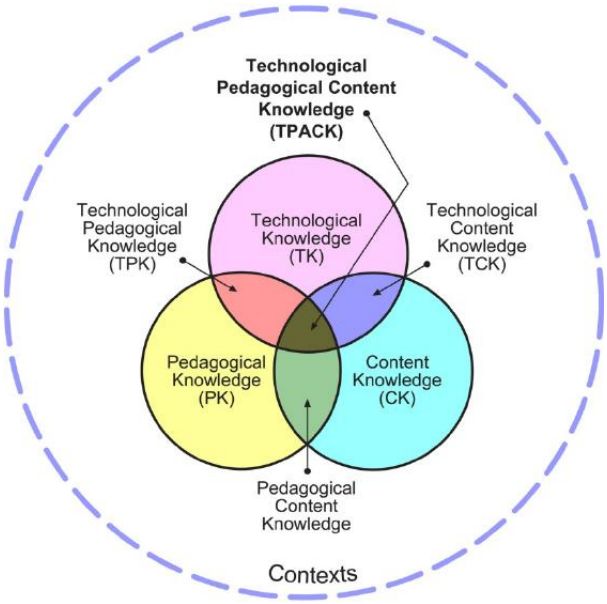
Based on observations, to be able to achieve fun and enjoyable online learning, teachers must strengthen based skills Technological Pedagogical Content Knowledge, namely those related to mastering information technology computer skills, especially in mastering social media, developing learning tools related to e-learning and developing teaching materials that can be applied virtually through digital meeting applications such as Zoom, Google Meet, and many online learning media. Teachers can arrange fun learning for their students so that students don't feel bored while studying at home. Because according to research, many parents are not actively involved in their children's education, this is due to busy work and parenting factors. In addition, another factor is that teachers who are monotonous in teaching online

make children tend to get bored of studying at home. Through the collaboration of teachers with school principals in terms of human resource management, Technological Pedagogical Content Knowledge in maintaining the complete integrity of nationalism (Dahnial et al., 2021).

According to Valtonen (2019), applying based learning Technological Pedagogical Content Knowledge requires a learning model that combines all elements Technological Pedagogical Content Knowledge. Then, according to Akyuz (2018), Technological Pedagogical Content Knowledge-based learning model is the complete learning design from learning practices that are explained from beginning to end so specifically by educators to achieve learning objectives. Innovative and creative learning design and adapting to student characteristics can improve learning in the 21st century a combination (Technology, Pedagogic Content Knowledge) with a question-and-answer model can challenge students to solve their own problems using technology and to help students become a smart generation at the same time competent (Bennett et al., 2018). Therefore, to create quality learning, teachers must understand and proficiency good curriculum design, one of the best ways to learn is to apply learning tools based on Technological Pedagogical Content Knowledge and learning methods based on Technological Pedagogical Content Knowledge in the classroom (Zimmer, 2022). In previous research, it has been carried out by Correia et al. (2020), explain the characteristics of Technological Pedagogical Content Knowledge-based learning and the potential application of Technological Pedagogical Content Knowledge in learning but has not explained the effect of implementing Technological Pedagogical Content Knowledge-based learning tools and methods on the quality of learning. Therefore, this study aims to see the effect of learning tools based on Technological Pedagogical Content Knowledge and learning methods based on Technological Pedagogical Content Knowledge on the quality of learning. So that it can inspire teachers to design device-based learning and learning methods with Technological Pedagogical Content Knowledge models in higher quality classrooms.

Figure 1

Technological Pedagogical Content Knowledge Model (Tanak,2020)



Method

The type of research used in this research is quantitative research (Cooper, 2018). The research estimate chosen by the researcher is an empirical estimate, also known as a semi-empirical estimate. To regain the influence of others under controlled circumstances. Empirical research aims to describe what happens when certain variables are controlled or manipulated in certain ways. The emphasis is on relationships between variables, where intentional manipulation of variables is part of the empirical approach. The population of this study is only teachers. Researchers used observational techniques, questionnaires, and documentation in this data collection research. The data obtained were analyzed at data collection, editing,

coding, tabulation, analysis, and concluding. The analytical technique used in this study is the T and F tests.

Table 1
Indicator

No	Definition	Indicator
1	Developing a Technological Pedagogic Content Knwoladge (X1) Learning Model	Indicators of achievement of the ability to connect each material. Relevant learning objectives Determine the correct teaching method. Develop effective learning steps. Identifying learning resources that are accessible to students is simple. Create technology-based assessment tools. Integrate study programs with technology
2	Developing a Technological Pedagogic Content Knwoladge Learning Model (X2)	Select the learning mode that students are interested in. Define model learning according to the situation in the classroom. Communicate with all parties (principals, parents) and students) well through social media. First test the learning model that will be used. Analyzing the shortcomings of the learning model that has been applied. Able to manage class. Mastering the learning model that will be used to teach
3	Quality of Online Learning (Y)	Students enthusiastically participate in online learning from beginning to end. Students actively ask critical questions. Students respond positively to statements given by educators

Result and Discussion

Before testing a theory, the following points should be evaluated first. This test is carried out to ensure that the data used is consistent with the distribution of the data. Generally, the data is distributed when the significance level is more significant than 0.05. On the other hand, if the level value is less than 0.05, the data shows a difference. Based on data analysis using a computer program that is equal to 25.0. You can see significant values indicating the authenticity of the data. A valid method can be used to divide if the data results from the amp coefficient. The output of the Kolmogorov-Smirnov test is > 5% (0.05) of the alpha scale.

The linearity test in this study used a regression error. Linearity If the sig value on the deviation line from F has a significance greater than 0.05, it is said to be linear. If it is not important, the linearity test is continued with curve estimation by estimating the sig value on the important linear curve line. 0.05. From the results of the linearity test of the learning device variables based on Technological Pedagogical Content Knowledge X1 for the Online Learning Quality variable Y, the linearity significance value was 0.00, the linearity deviation was 0.629 0.05, and the learning device variable was based on Technological Pedagogical Content Knowledge X1 ". It is linear with the variable "quality of learning". Thickness Y The significance can be seen from the linearity test output of the learning model based on Technological Pedagogical Content Knowledge X2 for the variable "Quality of Online Learning Y". With a linearity value of 0.00 and a deviation from linearity of 0.114 to 0.05, it can be concluded that the learning model variable based on Technological Pedagogical Content Knowledge X2 is linear to the online learning quality variable Y.

The homogeneity test aims to show that two or more groups of sample data from the population have similar differences. In regression analysis, the analysis required is the regression error which has the same difference in each group, based on the dependent variable. The results of the homogeneity test data analysis between the online learning quality variable

Y and the teaching materials variable (X1), the learning model (X2) shows that: (1) The P value of the Technological Pedagogical Content Knowledge X1-based learning device is 0.103 > 0.05, so: Sample homogeneous data. (2) The P value for the training model based on Technological Pedagogical Content Knowledge X1 is 0.148 > 0.05, so data extraction will be carried out. Homogeneous sample. To determine the significance of the hypothesis, you need to perform a t-test (partial test).

Table 2
T-Test Variable X1 to Y

Coefficients						
		Unstandardized Standardized	Coefficients			
Model		B	Std. Error	Beta	t	Sig.
1	Constant	-1,580	16.714		-,095	,926
	Learning Tools based on Technological Pedagogical Content Knowledge	,952	,351	,500	2,711	0.013
Dependent variable: Quality of online learning						

From the coefficient Table 2, the t value is 2.711 and the sig value is 0.000. This means that with a probability level (confidence interval) of 0.013 (97%), t count is 2.711 and t table with df = n-2 24-2 = 22 is 1.717. From these calculations obtained t arithmetic 2.711 > t table (2.711 > 1.717) and sig & l t; 0.01 (0.013 < 0.05) which means H0 is rejected and Ha1 is accepted. The importance of this means that the development of learning tools based on Technical Pedagogical Content Knowledge will have a significant impact on the quality of online learning.

If it is impossible to write tables, pictures or graphs using one side of the column, you can combine the two existing columns.

Table 3
T-Test Variable X2 to Y

Coefficients						
		Unstandardized Standardized	Coefficients			
Model		B	Std. Error	Beta	t	Sig.
1	Constant	-5,993	9,921		-,604	,552
	Learning Tools based on Technological Pedagogical Content Knowledge	1.074	,214	,731	5.018	,000
Dependent variable: Quality of online learning						

From the coefficient table above, the t-count is 5.018 and the Sig value is 0.000. This means that the probability level (confidence level) is 0.000 and the t count is 5.018. Table t with df = n-2 = 24-2 = 22 is 1.717. From these calculations obtained t arithmetic 5.018 > t table (5.018 > 1.717) and sig & lt; 0.01 (0.000 < 0.05) meaning that H0 is rejected and Ha2 is accepted. This interest means that developing a learning model based on Technological Pedagogical Content Knowledge will affect the quality of online learning. In addition to the t-test, this study also uses the F-test. This is intended to determine whether the combination of independent variables significantly affects the dependent variable.

Table 4
F test Variable X1, X2 to Y

Anova						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	365,475	3	121,825	11,836	,000b
	Residual	205.858	20	10,293		
	Total	571,333	23			
Dependent variable: Quality of online learning						
Predictors: (Constant), Technological-based Teaching Materials Pedagogical Content Knowledge, Technological-based Learning Tool Pedagogical Content Knowledge, Technological-Based Learning Model Pedagogical Content Knowledge						

Based on the data from the F-test using the program data analysis of 25.0, the calculated F is 11,836 with a significance of 0.000, while the F table has a value of n = 24 and df1 = K-1 =. The F table is 3.098 because 4-1 = 3 and df2 = nk-1 = 24-3-1 = 20. Therefore, F count > F Table (11.836 > 3.098) and the significance value is 0.00 & lt;0, 05. This shows that the calculated F value obtained is significant, so the working hypothesis tested in this study is between the X2 learning model based on the X1 learning device variable, Technological Pedagogical Content Knowledge X3 and online quality have a positive and significant effect.

From the regression results, it can be concluded that the correlation coefficient / R is 0.800 which strongly influences the online quality of teaching materials for lecturers and educators based on learning device variables X1, learning model X2, and Technological Pedagogical Content Knowledge X3. While the coefficient of determination (R2) is 0.640, meaning that the learning device variables X1, learning models X2, and educational materials based on Technological Pedagogical Content Knowledge X3 contribute to the quality of online learning by 64%. The remainder is 36%, for reasons other than the investigated variables. This shows that educators must integrate learning tools, models, and materials based on Technological Pedagogical Content Knowledge to meet their online learning needs. It has been shown to improve the quality of online learning. In addition, this also means that educators and other trainers must develop further to change, especially in the challenges of the Industrial Revolution 4.0. Educators who are open-minded and active can quickly adapt to ensure quality learning is maintained to achieve the ideals of national education. Based on the results of this survey, several factors affect the quality of online learning. Educators who are open-minded and active can quickly adapt to ensure quality learning is maintained to achieve the ideals of national education. Based on the results of this survey, several factors affect the quality of online learning. Educators who are open-minded and active, can quickly adapt to ensure quality learning is maintained to achieve national education goals. Based on the results of this survey, several factors affect the quality of online learning.

The direction of learning during the pandemic is to create students with reliable quality and abilities. To achieve this, we need to start by developing quality educators. Qualified educators are educators who have four criteria for the ability of educators. Based on Government Regulation No. 19 of 2005 concerning National Education Standards, it is stated that there are four skills of pedagogic educators, personal, professional, and social. According to Schmidt al. (2020), in terms of developing educators, it is necessary to use a model that is close to the four competencies by using Technological Pedagogical Content Knowledge. This model was first popularized by Kohler & Mishra in introducing the Technical Pedagogical Content Knowledge framework, starting with the concept of Educational Content Knowledge. Mishra & Koehler have added a technology component to Educational Content Knowledge. According to Redmond & Lock (2019), Knowledge of Technical Education Content is a complex framework of interactions between educators' knowledge of content, pedagogy, and technology. Technical Pedagogical Content Knowledge is knowledge integration that aims to integrate information and communication technology and teaching technology into the

learning process in the classroom. View Bayram-Jacobs et al. (2019), revealed that Technical Pedagogical Content Knowledge is the basis for effective learning using technology and can improve students' problems when they can understand difficult and simple topic concepts. Each educator can also build students' knowledge by developing learning methods and strengthening knowledge. According to Santos & Castro (2021), Technical Pedagogical Content Knowledge can be described as educators' knowledge about when, where, and how to use technology, as well as student guidance to supplement knowledge and expertise in a particular field of study. So that one form of Technical Pedagogical Content Knowledge operation in literacy is the use of technology by educators in teaching certain subjects.

The development of learning tools based on Technical Pedagogical Content Knowledge has a significant impact on the quality of online learning, the better educators' understanding of learning tools based on Technical Pedagogical Content Knowledge, the better the quality of online learning (Bostancıoğlu & Handley, 2018). It is noted that many educators themselves do not understand and do not understand how important and necessary education is in the implementation and development of education, with good leadership, the learning process of educators goes well, educators are not only educators, but also education managers. Hebebci et al. (2020) said that educators are required to carry out administrative duties regularly and must properly regulate everything related to the learning process. According to Falloon (2020), with the Technical Pedagogical Content Knowledge approach, educators are not limited to formal learning planning, they need to combine art education with physical content packaged with modern technology. This can improve the quality of learning, especially in online learning. According to Sánchez-Cruzado et al. (2021), what is needed in this era of online literacy are educators who can master or at least use technology that supports the orientation and literacy process, in addition to the use of technology, there are also important implications that need to be considered when understanding the literary process, video education practices, and generalization of the subjects taught. Therefore, it is necessary to find a way to clarify the three aspects of the Technical Pedagogical Content Knowledge approach. According to Ramírez-Montoya et al. (2021) stated that Technical Pedagogical Content Knowledge is a necessary framework for educators to improve their practice of understanding education and abstracts along with technical literature.

Technical Pedagogical Content Knowledge, packaging material with a literacy model according to its characteristics and integrated into technology, the literacy model is an abstract framework that describes a systematic approach in carrying out educational activities to achieve literacy goals (Huang & Lajoie, 2021). Therefore, to improve educators' understanding of the general concept of literacy based on Technical Pedagogical Content Knowledge, learning is designed so that educators can develop learning tools in the form of lesson plans. One way to support the development of educators' abilities in integrating technology into the guidance and literacy process is to use the Technical Pedagogical Content Knowledge approach. It helps create a framework for integrating educator content, or the ability to create specialized knowledge, educational and technical skills (Chai et al., 2019). This ability is expected to produce interesting literary works for students to achieve the expected literary goals then increase print capacity for the provision of reading and writing materials in the Technical Pedagogical Content Knowledge process which takes place in one day, followed by processing reading and writing materials in the Technical Pedagogical Content Knowledge process (Greeno, 2021).

The development of a learning model based on Technical Pedagogical Content Knowledge significantly impacts the quality of online learning, so the more educators learn a learning model based on Technical Pedagogical Content Knowledge, the quality of their online learning will be better (Dong et al., 2020). According to Tondeur et al. (2020), choosing a Technical Pedagogical Content Knowledge-based learning method is not just about combining learning methods by adding new techniques into the learning structure. Good learning methods and techniques require a change of discipline to make teaching and learning fun. With the development of Technical Pedagogical Content Knowledge technology, educators are

accustomed to designing literacy campaigns that are suitable for certain pedagogies, produced for certain content through selected literacy models (Wang, 2019). Therefore, educators must wisely choose tutoring methods and literacy models that are in accordance with the subject matter and technology that they want to use in tutoring, education is carried out by means of literacy for writers, so that learning objectives can be achieved optimally, and various literacy models will emerge so that In practice, supervisors must remember that no one model of skeletal literacy works for all situations and conditions.

Educators obtain these competencies through learning experiences and training activities during their education in tertiary institutions. Competent educators have the confidence to improve academic achievement. According to Bagadaeva et al. (2021), the achievement of these competencies will prepare prospective educators more maturely to fulfill their roles and responsibilities as educators, readiness usually refers to the willingness of an educator to learn new information. This allows the readiness of educators in the future to be a benchmark for future educator performance. Therefore, education must ensure that prospective educators are prepared to become educators. Social Learning Theory of Career Decision Making (SLTCDM) theory proposed by Krumboltz argues that job or job preparation is influenced by individual career decision choices and that career decisions are influenced by four factors: genetic factors, environmental conditions, learning experiences and ability to understand tasks. The learning experience results will shape the interests, abilities, individual beliefs, values and qualities. As a result, the outcome of the learning experience can affect job or career readiness. In the context of prospective educators, job preparation or prospective educator careers are influenced by career decisions to be chosen, prospective educators can make decisions about their career choices based on the learning experiences they gain in their educator education at universities. The result of this learning experience is that prospective educators gain the competence of educators to improve their quality. Therefore, the competence of educators can affect the preparation for future work or careers of educators. From the learning models above, The Technical Pedagogical Content Knowledge approach can be used to develop more learning models by incorporating learning designs that use technology in it, namely when conducting online learning, educators are also required to master pedagogy or how to communicate appropriate learning to students. educators must have knowledge of the content (material) that will be given to students so that the teaching process is more effective.

Conclusion

Some of the opportunities that educators have in developing their competencies can continue to be explored and must be owned by educators, so from every role that educators must have, of course it cannot be denied in the development of the era that is taking place at this time. The era of digitalization forces every educator to be able to master various learning models to prepare students who are much more prepared to answer challenges in the future, one of the models that educators can choose is Technical Pedagogical Content Knowledge, with this model educators can develop the learning process in the classroom.

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