

# The Influence of 21st Century Professional Competence on the Implementation of TPACK by Elementary School Teachers in Jetis District, Yogyakarta

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**Abstract:** This research is motivated by current developments that require teachers to continuously improve their competence. One crucial competence is the professional competence of 21st-century teachers. The purpose of this study is to determine the professional competence of 21st-century teachers in Jetis District, Yogyakarta City, and to examine whether teacher competence affects the implementation of the TPACK learning framework in elementary schools within the district. The research method used is quantitative with a correlational approach. Data were collected through observations and questionnaires. The research subjects were 25 teachers from SD N 1 Jetis and SD N Jetisharjo. The study was conducted from April to May 2024. The focus of this research is on the professional competence of 21st-century teachers and their application of the TPACK model in teaching. Data analysis was carried out using a simple linear regression technique. The results show that teachers in Jetis District possess the professional competencies required in the 21st century. This conclusion is based on the results of observation data. Furthermore, the study reveals a significant influence between professional competence and TPACK implementation among elementary school teachers. This is supported by the hypothesis test results, which indicate a product moment correlation value of 0.879. This exceeds the  $r_{table}$  value at a 5% significance level ( $N=23$ ) of 0.3961. Since  $r_{count} > r_{table}$ , the null hypothesis ( $H_0$ ) is rejected and the alternative hypothesis ( $H_a$ ) is accepted. Thus, professional competence positively influences TPACK implementation

**Keywords:** Professional Competency, 21st Century, TPACK

## INTRODUCTION

Technological developments in the 21st century have progressed rapidly. Many aspects have evolved significantly through computing technology and unlimited data, influenced by the advancement of the internet and digital technologies that support the wave of connectivity between humans and machines (Effendi & Wahidy, 2019). This phenomenon impacts various fields of life, including education. Technology plays a crucial role in improving and advancing the educational process (Khotimah, 2022), and its development has also penetrated the field of education.

These technological advancements require education to produce human resources who are capable and ready to implement technology-based learning (Khotimah, 2022). These human resources refer to teachers. Without realizing it, learning has shifted from conventional methods to ICT-based learning (Mustari, 2023). Therefore, teachers must not only teach using concrete materials to help students understand but also utilize technology to enhance students' comprehension (Tapilouw et al., 2021).

As technology becomes integral to education, teachers are required to possess strong competencies. Teacher competencies include personal, social, and professional competencies, which are typically acquired through professional education (Risdiyani, 2021). Among these, professional competence is essential for teachers to face 21st-century challenges (Bagou & Sukung, 2020).

A teacher's ability to carry out their duties and responsibilities effectively is known as teacher competence (Illahi, 2020). Competence can be defined as the basic behaviors or characteristics that reflect a person's motivation, traits, knowledge, or skills leading to high performance in their job (Widodo & Yandi, 2022).

Competence refers to a person's core characteristics that enable them to deliver superior performance (Junaidi, 2021). According to Byars and Rue in Junaidi (2021), competence is a trait or characteristic required for effective job performance, including knowledge, skills, and behaviors. As learning agents, teachers act as facilitators, motivators, inspirers, and designers of the learning process (Permanasari, 2023).

According to the Regulation of the Minister of Education and Culture of the Republic of Indonesia No. 6 of 2018, a teacher is a professional educator whose main tasks are to educate, teach, guide, direct, train, assess, and evaluate students in early childhood, elementary, and secondary education (Hidayat & Kosasih, 2019). Thus, a teacher is a professional educator. Professional competence refers to a teacher's ability to master the subject matter deeply. As professionals, teachers must keep up with the times, especially regarding 21st-century technologies (Berliana & Andarini, 2023).

One innovation in 21st-century education is the TPACK framework. Technological Pedagogical Content Knowledge (TPACK) is a framework that integrates technological knowledge, content knowledge, and pedagogical knowledge into learning (Rahmadi, 2019). This framework aligns instructional content with students' needs and incorporates technology. The goal of TPACK is to realize technology-based 21st-century

learning. TPACK includes seven components: Technological Knowledge (TK), Pedagogical Knowledge (PK), Content Knowledge (CK), Technological Pedagogical Knowledge (TPK), Technological Content Knowledge (TCK), Pedagogical Content Knowledge (PCK), and Technological Pedagogical Content Knowledge (TPACK) (Rahmadi, 2019).

Based on a one-week study conducted from January 2–9, 2024, in Jetis District, specifically at SD Negeri 1 Jetis and SD Negeri Jetisharjo, it was found that Jetis has 15 elementary schools—9 public and 6 private—with a total of 232 teachers. SD Negeri 1 Jetis has 23 teachers, while SD Negeri Jetisharjo has 17. Teachers in Jetis District, Yogyakarta City have begun incorporating technology into their teaching processes. Technology use extends beyond school promotion; it is now embedded in classroom and extracurricular activities. Teachers in these schools utilize various innovative online platforms such as Canva, Quizizz, and Wordwall. One teacher was even selected to participate in a national innovation teaching competition organized by the Ministry of Education and Sports to improve teacher competencies in Indonesia. SD Negeri 1 Jetis and SD Negeri Jetisharjo were chosen as research locations because their 21st-century professional competence, particularly in implementing TPACK, has not been previously studied. Professional competence was selected as the focus because we are now in the 21st century, where technology is advancing rapidly. Therefore, teachers must possess relevant professional competence to keep up with educational progress.

SD Negeri 1 Jetis is known for its high teacher competence, as evidenced by its excellent National Assessment (AN) results and teacher report cards. Similarly, SD Negeri Jetisharjo is one of the most popular schools in the district based on student enrollment and also has high AN scores. The high teacher competence in Jetis is demonstrated through various activities such as lesson planning, implementation, student assessment, professional development, and publishing work. Continuous teacher training is conducted to upgrade their knowledge, making them more professional and better equipped to follow technological advancements, especially in education.

This research aims to examine the influence of 21st-century teacher professional competence on the implementation of TPACK among elementary school teachers in Jetis District, Yogyakarta. This research seeks to expand the author's knowledge, provide

insights to teachers in Jetis District, and offer references regarding 21st-century professional teacher competencies.

## **METHOD**

This study uses quantitative research with a correlational approach. Quantitative research is a type of research that generally uses statistical analysis (Ulfa, 2021). Therefore, in quantitative research, measurement of the phenomenon of interest is important, so data collection is carried out using a structured questionnaire (survey) that is compiled based on measurements of the variables being studied, which then produces quantitative data. Correlational research, on the other hand, is research that aims to determine the relationship between two or more variables that have a causal relationship with other variables (Khasanah, 2023).

The reason for choosing correlational research as the research method is because this research has a relationship between one variable and another. The variable in question is the influence of teachers' professional competence on the application of TPACK by elementary school teachers in the Jetis District of Yogyakarta. Thus, it can be concluded that this research was conducted to examine the relationship between teachers' professional competence and the application of TPACK by elementary school teachers in the Jetis District, Yogyakarta City.

This research was conducted in Jetis District, Yogyakarta City, Special Region of Yogyakarta. There are 15 schools in this district, including 9 public schools and 6 private schools. The total number of teachers is 232. Therefore, the population of this research consists of 232 teachers from 15 schools in Jetis District, Yogyakarta City, Special Region of Yogyakarta. This study selected 2 out of 15 schools in Jetis District, Yogyakarta City, Special Region of Yogyakarta. The elementary schools chosen were SD Negeri 1 Jetis and SD Negeri Jetisharjo because they met several criteria for this study. The number of teachers sampled in this study was 25. Before obtaining the research results, we need to collect data, and in the data collection process, various data collection techniques are employed. Data collection techniques are the most critical step in research, as the primary objective of any study is to obtain data (Ratnawati et al., 2021). The data collection techniques used in this study are observation and questionnaires.

After obtaining the research data, the next step is to analyze the data. This research uses a computer software tool, namely the Statistical Product and Service (SPSS) program on SPSS 20. SPSS is a computer program used as a tool to analyze data using statistical analysis techniques (Cecotti et al., 2024). In this study, the analysis used is simple linear regression analysis, basic assumption testing, and hypothesis testing.

## **RESULT AND DICSUSSION**

After conducting observational research, it was found that teachers in Jetis District, Yogyakarta, possess the professional competencies of 21st-century teachers. This is evident from the teaching processes implemented by the teachers. Teachers have utilized a variety of diverse media and incorporated technology into their lessons. The educational media used are highly varied, such as Quizizz, Canva, Wordwall, educational videos, puzzles, and many others.

In addition to using diverse learning media and implementing technology, teachers also continuously engage in professional development and scientific publication. This is evident in teachers frequently participating in training and workshops to enhance their competencies. Teachers also present and publish research findings, one example being a fifth-grade teacher at SD N 1 Jetis who has published their results in the form of an article.

In addition to observation, questionnaires were also distributed to the research subjects. The data from the questionnaire distribution was then analyzed. The first analysis conducted was a basic assumption test, which produced a normality test as shown below.

**One-Sample Kolmogorov-Smirnov Test**

		Unstandardized Predicted Value
N		25
Normal Parameters <sup>a,b</sup>	Mean	112.6000000
	Std. Deviation	13.53859973
Most Extreme Differences	Absolute	.161
	Positive	.145
	Negative	-.161
Test Statistic		.161
Asymp. Sig. (2-tailed) <sup>c</sup>		.094
Monte Carlo Sig. (2-tailed) <sup>d</sup>	Sig.	.093
	99% Confidence Interval	Lower Bound .086
		Upper Bound .101

a. Test distribution is Normal.

b. Calculated from data.

c. Lilliefors Significance Correction.

d. Lilliefors' method based on 10000 Monte Carlo samples with starting seed 2000000.

**Figure 1.** Normality Test

From the One Sample Kolmogorov-Smirnov graph, we obtain a probability value or Asymp. Sig. (2-tailed) of 0.094. This value is greater than 5% or 0.05. Therefore, we can conclude that the data distribution is normal.

Next, we perform a simple linear regression analysis. The results of this analysis produce the following data.

**Coefficients<sup>a</sup>**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1	(Constant)	23.175	10.212	2.270	.033
	Total	1.211	.137	.879	<.001

a. Dependent Variable: Total2

**Figure 2.** Simple Linear Regression Analysis

The results of the simple regression coefficient calculation above show that the constant coefficient value is 23.175 and the independent variable (X) coefficient is 1.211. Thus, the regression equation  $Y=23.175+1.211X$  is obtained. Based on this equation, the constant value is known to be 23.175. Mathematically, this value indicates that when the variable X is 0, the variable Y has a value of 23.175.

The final analysis performed is a hypothesis test. The results of this test are as follows.

Coefficients <sup>a</sup>						
		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	46.210	14.819		3.118	.005
	X	.899	.198	.687	4.534	<.001

a. Dependent Variable: Total2

**Figure 3.** Hypothesis Testing

From the table above, we can conclude that the null hypothesis or  $H_0$  is rejected while the alternative hypothesis or  $H_a$  is accepted.  $H_0$ : There is no influence between the professional competence of 21st century teachers and the implementation of TPACK by elementary school teachers.  $H_a$ : There is an influence between the professional competence of 21st century teachers and the implementation of TPACK by elementary school teachers.

## DISCUSSION

Through observation, it can be seen that teachers in Jetis Subdistrict already possess the professional competencies of 21st-century teachers. This can be seen from the teaching process, starting from lesson planning to teacher development. This is in line with the research conducted by Wahyuni et al. (2023), which explains that a teacher can be considered professional if they have high-quality teaching skills.

The learning process begins with lesson planning, where teachers create learning modules. The learning modules used by teachers at SD N 1 Jetis and SD N Jetisharjo have already integrated technology into their teaching processes. The learning media used are diverse and up-to-date, incorporating technology. This technological competence contributes to professional development and the learning process (Erviana et al., 2022).

Teachers are skilled and competent in using technology in the learning process. The 21st century education era requires an increase in the capacity of human resources who are literate in technological advances (Wahyuni et al., 2023). The use of technology by teachers at SD N 1 Jetis and SD N Jetisharjo can be seen in the learning media used for teaching.

The learning media used are very diverse, such as Quizizz, Canva, Wordwall, educational videos, puzzles, and many more. These learning media are used to deliver material so that students better understand what the teacher is conveying. In addition to learning media, in the implementation of learning, teachers deliver material in accordance with guidelines or teaching modules. Teachers have a thorough understanding of the

material being presented to students. This aligns with the findings of a study conducted by Utami & Hasanah (2020), which states that one of the requirements for teachers to possess professional competence is the ability to master the subject they teach.

In addition to conducting observations, this study also involved distributing questionnaires to teachers in Jetis Subdistrict. The distribution of these questionnaires aimed to determine whether there was an influence of 21st-century professional competence on the implementation of TPACK by elementary school teachers in Jetis District, Yogyakarta City, in the learning process. The questionnaires were filled out by the research subjects, namely 25 teachers at SD N 1 Jetis and SD N Jetisharjo. The teachers answered the statements in the questionnaires.

The data from the teachers' responses to the questionnaire statements were then processed using SPSS software. The results of the data analysis showed a product moment correlation of 0.879 compared to the significance level of 5%  $N=23$  of 0.3961. Since the calculated value is greater than the table value, it can be interpreted that the null hypothesis ( $H_0$ ), which states that there is no influence between 21st-century professional competence and the implementation of TPACK by elementary school teachers, is rejected, and the alternative hypothesis ( $H_a$ ), which states that there is an influence between 21st-century professional competence and the implementation of TPACK by elementary school teachers, is accepted. With a coefficient of determination of 77.26%, rounded to 77%, there is a positive effect, meaning that the higher the professional competence of teachers, the higher the quality of the implementation of TPACK by elementary school teachers.

Based on the results of the above analysis, it can be concluded that the null hypothesis is rejected while the alternative hypothesis is accepted. This is seen from the product moment correlation value analyzed. In other words, there is a significant influence between 21st-century teacher professional competence and the quality of TPACK implementation by elementary school teachers in Jetis Subdistrict.

In addition to being able to deliver material well, teachers also engage in self-development and scientific publications. This can be seen in the fact that teachers often participate in training and socialization to improve their competencies. Teachers also present and publish research results, one of which is a 5th grade teacher at SD N 1 Jetis who has published the results in the form of an article.



## CONCLUSION

Based on the results of the study on “the influence of 21st century professional competencies of teachers on the implementation of TPACK by elementary school teachers in Jetis District, Yogyakarta,” it can be concluded that elementary school teachers in Jetis District, Yogyakarta, have high 21st century professional competencies. This can be seen from the diversity of teaching media used by teachers and their enthusiasm in participating in training or socialization programs for competency development. Additionally, it was concluded that there is an influence of teachers' competencies on the quality of TPACK implementation by elementary school teachers in Jetis Subdistrict, Yogyakarta. This is demonstrated by the results of the analysis conducted, which show that  $H_0$  is rejected and  $H_a$  is accepted.

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