

## The Influence of Teacher's Pedagogic Competence and Professional Competence on Mathematics Learning Outcomes of High School Students in Sigi Regency

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### Abstract

*The purpose of this study was to obtain information that teacher pedagogical competence factors and teacher professional competence factors play an important role in the mathematics learning outcomes of high school students in the Sigi Regency, either partially or simultaneously. This study uses multiple linear regression analysis through data obtained from the results of the pedagogical and professional competency tests of mathematics teachers and the average scores of high school students on national mathematics exams obtained at the LPMP office. The sample in this study amounted to 21 mathematics teachers from 10 public and private high schools in Sigi Regency. The results obtained show that simultaneously, the significance value (sig.) = 0.444 and the significance of the multiple regression coefficients F is 0.912, and partially for the effect of teacher pedagogic competence the significance value (sig.) = 0.929 and the F value of 0.008, while for the effect of professional competence the teacher's significance value (sig.) = 0.255 and the F value of 1.505. Taken together, teacher pedagogical competence and teacher professional competence do not affect the mathematics learning outcomes of high school students in Sigi Regency.*

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### Introduction

A teacher needs to have a personality, master the subject matter, and master teaching methods as his competence. Without this, the teacher will fail in carrying out their duties. So teaching competence must be owned by a teacher which is a skill in managing educational activities. Thus teachers who have teaching competence are able to create an effective and fun learning environment and are better able to manage their classes so that student learning outcomes are at an optimal level. In addition to the foregoing, "Competence in the process of teaching and learning interaction can also be an extrinsic motivation tool, in order to provide encouragement from outside the students" (Djamarah, 1991).

Law of the Republic of Indonesia Number 14 of 2005 Article 1 concerning Teachers and Lecturers explains that: "Teachers are professional educators with the main task of educating, teaching, guiding, directing, training, and evaluating students in early childhood education through formal education, basic education, and secondary education" (Republik of Indonesia, 2012).

In connection with the explanation above, it can be concluded that a teacher must have the competence referred to in Law No. 14 of 2005 Article 8 covers pedagogical competence, personal competence, social competence, and professional competence through professional education. Teacher is a position or profession that requires special skills as a teacher. This job cannot be done by people who do not have the skills to do activities or work as a teacher. People who are good at speaking in certain fields cannot be called teachers. To become a teacher, special requirements are needed. Moreover, a professional teacher must be able to master the intricacies of education and teaching with various other sciences that need to be nurtured and developed through certain periods of education or pre-service education. In this study, the competence of teachers assessed was pedagogic competence and professional competence because the data available in the LPMP institution were only the two teacher competencies.

The problem of competence is one of the important factors in coaching teachers in a professional position. Competence is rational behavior in order to achieve the required goals with the expected conditions. Competence is a set of

intelligent actions full of responsibilities that a person must have as a condition to be considered capable of carrying out tasks in certain fields of work (Janawi, 2011).

Professional competence is the knowledge or skills that a teacher must have related to mastering learning material. A professional teacher is the ability of a teacher to carry out their main duties as an educator and teacher which includes the ability to plan, implement, and evaluate learning outcomes. Education is core between educators (teachers) and students (students) to achieve educational goals. In certain situations, the teacher's assignment can be represented or assisted by other elements such as technology media, but cannot be replaced. Educating is a professional job, therefore, teachers as the main actors of education are professional educators. As professional educators, teachers are not only required to carry out their duties professionally but must also have professional knowledge and abilities (Ilyas, 2011).

The learning process can be carried out well if it is supported by the competencies possessed by the teacher because the role and ability of teachers in creating an effective environment will have a major effect on improving student learning outcomes. With the competencies possessed by a teacher as a skill to become a professional teacher in improving student learning outcomes, moreover, students have different learning characteristics.

The role of teachers, especially in high school education, cannot possibly be replaced by other tools, because students are developing organisms that require adult guidance. The teacher's role in the learning process is not only as a model or role model for the students he teaches but also as a learning manager (Sanjaya, 2008).

The role of the teacher is crucial for the implementation of the learning process well in schools. One of the main factors determining the quality of education is the teacher. It is the teacher who is at the forefront of creating human resources. The teacher deals directly with the students in the class through the teaching and learning process, in the hands of the teacher, quality students will be formed, both academically, with skills (expertise), emotional maturity, and moral and spiritual. Therefore, a teacher who has high qualifications, competence, and dedication is needed in carrying out his professional duties (Kunandar, 2008).

Sigi Regency is one of the regencies in Central Sulawesi Province. There are still many schools in Sigi Regency that still lack teachers. In fact, teaching duties in several schools are carried out by the principal. This of course has implications for teacher competency problems and student mathematics learning outcomes. Based on observations made at several high schools in the Sigi Regency and at the LPMP Office of Central Sulawesi Province, researchers found that the average national exam scores, especially in mathematics, are still very low.

Based on this, it can be assumed that teacher competence which includes pedagogical competence and professional competence is a variable that can affect student mathematics learning outcomes. Therefore, researchers conducted research on the Effect of Teacher Competence on Mathematics Learning Outcomes of High School Students in the Sigi Regency.

#### **Method and Materials**

This study is research with an associative quantitative approach because the researcher will know the correlation and influence between one variable and another. The location of this research is all high schools in Sigi Regency, namely public and private high schools. The time of this research was March 2020. The population in this study were all public and private high school mathematics teachers in Sigi Regency. Based on data obtained from the Education Quality Assurance Institute (LPMP), it is known that there are 42 public and private high school math teachers. The sample in this study were all public and private high school math teachers in Sigi Matematika district who participated in UKG in 2016, both PNS and Non-PNS from 10 public/private high school schools in Sigi Regency, namely 21 mathematics teachers. The type of data collected in this study is quantitative data. The data can be measured or calculated directly, in the form of information or explanation expressed in numbers or in the form of numbers. Sources of data collected in this study are secondary data. The secondary data was obtained by researchers from the Education Quality Assurance Institute (LPMP). After conducting the research, the data collected from those obtained from the Central Sulawesi LPMP Office will be carried out as a descriptive analysis. Data analysis includes processing and interpretation

of the data processing results obtained on the basis of each variable.

Data analysis includes processing and interpretation of the data processing results obtained on the basis of each variable. The data in question is in the form of numbers indicating the score of the quantitative data. The purpose of analyzing the data is to obtain answers to the problems posed by the hypothesis. Before testing the hypothesis, first, the normality test and homogeneity test are carried out. This test is intended to test whether in a regression model the dependent variable, the independent variable, or

both have a normal distribution or not. A good regression model is a normal or near-normal data distribution.

**Results and Discussion**

The results of the study as shown in Table 5 show the regression equation in this analysis or study, namely  $Y = 29.396 + 0.003X_1 - 0.026X_2 + \epsilon$ , and it can be stated that the t-test results for each of the coefficients  $X_1$  and  $X_2$ , namely:  $t_1 = 0.030$  and  $p\text{-value} = 0.977 > 0.05$ ,  $t_2 = 2.336$  and  $p\text{-value} = 0.816 > 0$ .

**Descriptive data**

**Table 1.** Shapiro wilk normality test

	Kode	Shapiro-Wilk		
		Statistic	Df	Sig.
Competence	Teacher Pedagogical Competence	.938	10	.536
	Teacher Professional Competence	.911	10	.291
	Student Mathematics Learning Outcomes	.952	10	.692

**Test requirements analysis**

**Table 2.** Linearity test of teacher pedagogic competence with student mathematics learning outcomes

			Df	F	Sig.
Student Learning Outcomes (Mathematics National Exam Scores) *	Learning Between Groups	(Combined)	8	2.370	.466
		Linearity	1	.029	.894
		Deviation from Linearity	7	2.704	.438
Teacher Pedagogical Competence	Within Groups		1		

**Table 3.** Non-linearity test of teacher professional competence with student mathematics learning outcomes

	Df	F	Sig.
Regression	1	.077	.788
Residual	8		
Total	9		

**Table 4.** ANOVA tests the effect of teacher pedagogical competence ( $X_1$ ) and teacher professional competence ( $X_2$ ) on student mathematics learning outcomes ( $Y$ )

		Model	Df	F	Sig.
1	Regression		2	.034	.967 <sup>b</sup>
	Residual		7		
	Total		9		

**Table 5.** The regression coefficient test the effect of teacher pedagogic competence (X1) and teacher professional competence (X2) on student mathematics learning outcomes (Y)

Model	Unstandardized Coefficients			
	B	Std. Error	T	Sig.
1 (Constant)	29.396	6.155	4.776	.002
Teacher Pedagogical Competence	.003	.087	.030	.977
Teacher Professional Competence	-.026	.110	-.241	.816

**Table 6.** ANOVA tests the effect of teacher pedagogic competence (X1) on students' mathematics learning outcomes (Y)

Model	Df	F	Sig.
1 Regression	1	.011	.917 <sup>b</sup>
Residual	8		
Total	9		

**Table 7.** Test of the effect of teacher pedagogic competence (X1) on students' mathematics learning outcomes (Y)

Model	Unstandardized Coefficients			
	B	Std. Error	T	Sig.
1 (Constant)	28.606	4.894	5.845	.000
Teacher Pedagogical Competence	-.008	.071	-.107	.917

**Table 8.** ANOVA test effect of teacher professional competence (X2) on students' mathematics learning outcomes (Y)

Model	Df	F	Sig.
1 Regression	1	.077	.788 <sup>b</sup>
Residual	8		
Total	9		

**Table 9.** Coefficient test of the effect of teacher professional competence (X2) on students' mathematics learning outcomes (Y)

Model	Unstandardized Coefficients			
	B	Std. Error	T	Sig.
1 (Constant)	29.481	5.099	5.781	.000
Teacher Professional Competence	-.025	.090	-.277	.788

### Simultaneous testing discussion

The results of the study are shown in Table 4. The significance value (sig.) = 0.967. Because the sig value of  $0.967 > 0.05$ , the multiple linear regression equation obtained is not significant. That is, there is no simultaneous influence of teacher pedagogical competence and teacher professional competence on student mathematics learning outcomes. From the multiple regression analysis, the significance of the multiple regression coefficient F is 0.034.

The results of the study as shown in Table 5 show the regression equation in this analysis or study, namely  $Y = 29.396 + 0.003X_1 - 0.026X_2 + \epsilon$ , and it can be stated that the t-test results for each of the coefficients X1 and X2, namely:  $t_1 = 0.030$  and  $p\text{-value} = 0.977 > 0.05$ ,  $t_2 = 2.336$  and  $p\text{-value} = 0.816 > 0.05$ .

The results of this study indicate that the variables of teacher pedagogical competence and teacher professional competence are simultaneously

proven to have no effect on student mathematics learning outcomes. So other factors affect the student's mathematics learning outcomes.

This is because when researchers conducted interviews with LPMP employees of Central Sulawesi Province, the competence of SMA mathematics teachers in Sigi Regency was categorized as quite high because all teachers were alumni from higher education institutions with bachelor's degrees in education. But what the researchers found from the students' mathematics learning outcomes was not in the high category. So the method applied by the mathematics teacher is not able to support students' mathematics learning outcomes.

The results of this study are in line with [Muhlis \(2016\)](#), research that there is no simultaneous relationship between teacher competence and student achievement in grade IV MI Bahrul Ulum Bontorea, Gowa Regency. It is inversely proportional to the research of [Primaningtyas \(2014\)](#), which shows that there is an influence of teacher competence and learning motivation on the achievement of student learning outcomes of class VIII SMP Negeri 6 Semarang 2012/2013.

Research by [Sinaga \(2014\)](#), shows that there is a significant influence between teacher competence on student achievement of SMA Negeri 1 Tanjung Beringin for the 2013/2014 academic year. Research by [Sappaile \(2017\)](#) shows that there is a positive direct effect of pedagogical competence, professional competence, and teacher professional attitudes on teacher assessment performance.

Research by [Fauth et al. \(2019\)](#) shows that teacher competence (knowledge of pedagogical content, self-efficacy, and enthusiasm for teaching) is positively related to student interest.

### Partial testing discussion

#### Teacher pedagogical competence (X1) to student mathematics learning outcomes (Y)

The results of the study are shown in Table 6 The significance value (sig.) = 0.917. Because the significance value of  $0.917 > 0.05$ , the multiple linear regression equation obtained is not significant. That is, there is no partial effect of teacher pedagogical competence on student mathematics learning outcomes. This is indicated by an F value of 0.011.

The results of the study as shown in Table 7 show the regression equation in this analysis or study, namely  $Y = 28.606 - 0.008X_1 + \epsilon$  and it is known that the t value of the pedagogic competence variable (X1) is equal to -0.107 Because the value of t counts  $-0.107 < t_{table} 2.306$ , it can be concluded that there is no effect of pedagogic competence (X1) on student mathematics learning outcomes.

From these results, it can be seen that the pedagogical competence of teachers has no effect on student mathematics learning outcomes. So other factors affect the student's mathematics learning outcomes. The lack of the number of mathematics teachers in SMA in Sigi Regency is one of the causes of the lack of intensity in the teaching and learning process of teachers. So of course it can affect student mathematics learning outcomes. Supported again by the lack of student interest in learning mathematics.

Based on the theory put forward by [Janawi \(2011\)](#), pedagogical competence is a skill or ability that must be mastered by a teacher in seeing student characteristics from various aspects of life, be it moral, emotional, or intellectual. The implications of this ability can of course be seen from the teacher's ability to master the principles of learning, from learning theory to mastery of teaching materials. Pedagogic competence is directly related to the mastery of educational disciplines and other sciences related to their duties as teachers. So, a prospective teacher must have a teacher education background that is relevant to their scientific knowledge.

The results of this study are in line with [Muhlis \(2016\)](#) research that there is no relationship between teacher pedagogical competence and learning achievement of fourth-grade students of MI Bahrul Ulum Bontorea, Gowa Regency.

It is also in line with [Rohman's \(2017\)](#), that t count ( $5\% = 0.066$ )  $< t_{table} (2.00)$  and at the Sign level  $0.947 > 0.05$ , so it can be concluded that  $H_0$  is accepted, which means there is no significant influence between competences pedagogic of Islamic education teachers towards student learning outcomes of Islamic Studies class XII at SMAN 1 Campurdarat Tulungagung.

Research by [Rubianto \(2018\)](#) shows that pedagogic competence has a positive effect on student learning outcomes.

[Hardiana et al. \(2013\)](#) shows that there is an effect of teacher pedagogical competence on student learning outcomes of Akidah Akhlak at MTs At-

Thoyyibah Depokrejo, Trimurjo sub-district, Central Lampung district. It is inversely proportional to Wulandari (2012) research which shows that teacher pedagogical competence has a significant positive effect on student achievement of class XII in SMA Kota Malang.

Research by Pahrudin et al. (2016) shows that teacher pedagogical competence has a positive direct effect on learning achievement by 18.7%, and pedagogic competence indirectly affects learning achievement through professional competence of 0.074. Research by Kunter et al (2013) shows that a two-tier structural equation model reveals positive effects of teachers' pedagogical content knowledge, enthusiasm for teaching, and self-regulation skills on teaching quality, which in turn influences student outcomes.

#### **Teacher professional competence (X2) to student mathematics learning outcomes (Y)**

The results of the study are shown in Table 8. The significance value (sig.) = 0.788. Because the significance value is  $0.788 > 0.05$ , the multiple linear regression equation obtained is not significant. That is, there is no partial effect of teacher professional competence on student mathematics learning outcomes. This is indicated by an F value of 0.077.

The results of the study as shown in Table 9 show the regression equation in this analysis or study, namely  $Y = 29.481 - 0.025X_2 + \varepsilon$  and it is known that the t value of the variable professional competence (X2) is equal to -0.277. Because the value of t counts  $-0.277 < t_{table} 2.306$ , it can be concluded that there is no effect of professional competence (X2) on student mathematics learning outcomes.

From these results, it can be seen that the professional competence of teachers has no effect on student mathematics learning outcomes. So that other factors affect the student's mathematics learning outcomes.

There are still some mathematics teachers who have a high school education background and the existence of teachers who are non-permanent teachers at SMA in Sigi Regency can cause the quality of education and teaching of teachers to high school students to be less than optimal. Because of a need to increase the number of mathematics teachers who attend lectures to a higher level and participate in training in improving teaching professionalism, in order to improve student mathematics learning outcomes.

Based on the theory put forward by Usman (2011) that professional competence is the ability, expertise, and basic skills of educators that must be mastered in carrying out their duties as teachers. He will be called a professional if he is able to master theoretical skills and practice the learning process and apply them in real terms. Teacher professional competence is one of the competencies that every teacher at the educator level must have.

The results of this study are in line with Muhlis (2016) research that there is no relationship between teacher professional competence and learning achievement of fourth-grade students of MI Bahrul Ulum Bontorea, Gowa Regency.

It is also in line with Wulandari (2012) research which shows that teacher professional competence does not have a significant positive effect on student achievement of class XII in SMA Kota Malang.

Syamsul et al. (2017), research shows that the professional competence of biology teachers is positively correlated with the learning outcomes of students in class XI IPA SMAN in Sinjai Regency.

Research by Nefida (2016) shows that the role of teacher professional competence on student achievement in grades X and XI in teaching English at SMA Negeri 1 Lubuk Sikaping, Pasaman Regency, generally meets the criteria as a professional teacher.

It is inversely proportional to the research of Pahrudin et al. (2016) which shows that professional competence has a direct effect on learning achievement in economic subjects by 30.8%, personality competence indirectly affects learning achievement through professional competence by 0.082, and social competence indirectly. effect on learning achievement through professional competence of 0.158.

Research by Kaiser et al. (2016) shows that on the one hand, both cognitive and situational approaches are needed for a comprehensive description of teacher professional competence. On the other hand, it appears that the two approaches can be productively integrated.

Research by Gabriele et al. (2016) shows that linking study results provides insight into the development of professional knowledge of mathematics teachers.

#### **Conclusions**

Based on the data that has been collected and paying attention to the discussions expressed and

the hypothesis testing that has been carried out, the following conclusions can be drawn: Together, teacher pedagogical competence and teacher professional competence do not affect the mathematics learning outcomes of high school students in Sigi Regency. Partially teacher pedagogical competence does not affect the mathematics learning outcomes of high school students in Sigi Regency.

Partially the professional competence of teachers does not affect the mathematics learning outcomes of high school students in Sigi Regency.

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