The Effect of Professional Competence and Pedagogic Competence of Teachers on Numeracy Literacy

Mochammad Tholchah Kais[1],Maufur[2], Muntoha Nasucha[3]
{tholchahkais@gmail.com[1]}

Magister of Pedagogy, Universitas Pancasakti Tegal, Indonesia

Abstract. The purpose of this study is to test (1) teacher professional competence towards student numeracy literacy, (2) teacher professional competence towards student numeracy literacy. This research was conducted on students of class XI MAN 1 Tegal for the 2021/2022 academic year, data obtained from questionnaires and documentation of student numeracy test results. The results of the study (1) the professional competence of teachers has a significant positive effect on the numeracy literacy of students; (2) the pedagogical competence of teachers has a significant positive effect on the numeracy literacy of students; (3) professional competence and pedagogical competence of teachers have a significant positive effect together with the numeracy literacy of students. Based on the results of the study as a whole, it can be seen that professional competence and pedagogical competence of teachers can affect the numeracy literacy of students.

Keywords: Numeracy Literacy, Pedagogic Competence, Professional Competence

1. Introduction

Education has a very strategic role in improving the quality of human resources and efforts to realize the nation's ideals. Indonesia in realizing good and quality education requires quality Human Resources (HR) in order to educate the nation's generation in the future and be able to compete in the world. Improving the quality of education in Indonesia has begun to be launched since the last few years. This can be seen by the government's attention to reforms in the field of education. 21st century education is an education that associates or integrates knowledge skills, attitudes, and skills with IT mastery so that the 21st century learning system from teacher centered learning to student centered learning (SCL). The principle of learning must be learning to know, learning to do, learning to be, and learning to live together. 21st century education is projected on 3 factors, namely character, competence or skills known as 4C, and literacy.

Literacy in the 21st century consists of 6 literacies, namely literacy, numeracy literacy, digital literacy, financial literacy, science literacy, and cultural literacy. Literacy skills as a prerequisite for 21st century life skills are developed through integrated education in both family, school, and community environments. As part of literacy skills, numeracy literacy is important for everyone to have. Numeracy literacy skills are necessary to solve everyday problems by using mathematical knowledge of both symbols and numbers[1–6]. Numerical literacy requires logical thinking so that it makes it easier for someone to understand mathematics, so that by having numerical abilities, one will be helped both in understanding the material, analyzing problems, and solving problems. Numeracy literacy is defined as the

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ability to apply the concept of numbers and numeracy operation skills in everyday life and the ability to interpret quantitative information that exists in the student's environment.

In fact, the numeracy literacy of Indonesian students at thenational level is still relatively low. This is seen based on the pisa test results, in 2015 Indonesia obtained a PISA score of 386 for mathematics from the average score of each country which is 487. Meanwhile, in 2018, the results of the PISA math test in Indonesia decreased, namely 379 from an average score of 489 [7]The test results of PISA (2015) and TIMSS (2016), two organizations under the OECD (Organisation for Economic Co-operation and Development) show that Indonesia is ranked at the bottom, even below Vietnam, a small country in Southeast Asia that has just become independent. The results of the math test organized by PISA between Vietnam and Indonesia are very far apart. Vietnam got a score of 495 (with an average score of 490), while Indonesia got a score of 387. Meanwhile, from the timms results, Indonesia got a score of 395 out of an average score of 500. Likewise, what happened in MAN 1 Tegal, it seems that not all students are proficient in mastering numeracy literacy skills. Based on the results of the 2021 ANBK try-out which was attended by a total of 430 students, data was obtained as many as 125 students (31.49%) were declared proficient, 114 students (28.72%) were declared capable, 136 students (34.26%) were in the basic category, and 55 students (13.85%) were in the category of needing special intervention.

Some of the causes of the above problems by researchers can be inventoried as follows:

1. Professional competencies in the existing field only have mastery of the material, contain formal abilities, do not yet have the ability to other scientific materials that have a relationship with the subject matter of a particular subject (enrichment material).
2. New pedagogic competencies include planning, implementing, and assessing learning that has not mastered the science of education.
3. The lack of awareness of teachers that professional kompetension and pedagogic k ompetension have an influence on numeracy ability.
4. The numeracy literacy ability of students is still low.

Based on the description above, the purpose of this study is to determine the significant influence of professional competence and pedagogical competence of teachers together on the numeracy literacy of students of class XI MAN 1 Tegal. Given the many developments that can be found in this problem, it is necessary to have clear boundaries of the problem regarding what is made and solved in this study. The limitations of the problems in this study are as follows:

1. Influence is a force that exists or arises from something.
2. Competence is a combination of knowledge, skills, values, and attitudes that are reflected in the habits of thinking and acting.
3. Professional competenceis the ability to master learning material broadly and deeply that allows it to guide learners to meet established competency standards.
4. Edagogic competence is the ability to understand students in depth and the implementation of educational learning including the ability to design ajaran, implement learning, assess the learning outcome process, and make continuous improvements.
5. A teacher is someone who has devoted himself to teaching a science, educating, directing, and training his students to understand the knowledge he teaches.
6. Literacy is the ability to use numbers, data, and mathematical symbols, as well as knowledge and skills in making decisions related to real problems in everyday life.

7. The population of this study was 454 students of class XI MAN 1 Tegal.

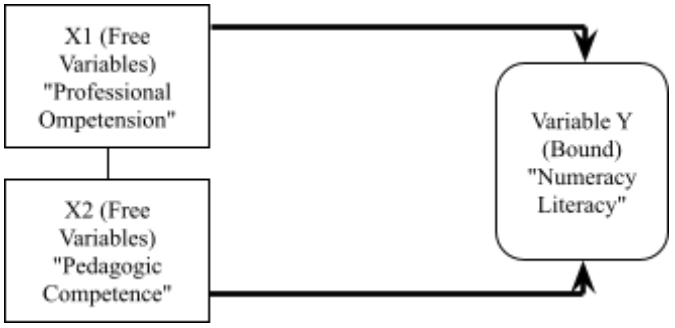
There is an interesting problem formulation that is worthy of scientific research, namely that there is no mastery of educational science, including about the professional competence of teachers. It is not enough for a professional teacher to have a formal mastery of the material but also to have the ability to other scientific materials. Pedagogic competence not only includes planning, implementing, and assessing learning but also mastering the knowledge of education andnumeracy literacy of students who are still low. Based on this, the problem questions that can be formulated are as follows:

1. Is there an influence of teacher professional competence on the numeracy literacy of class XI MAN 1 Tegal students?
2. Is there an influence of teacher pedagogic competence on the numeracy literacy of class XI MAN 1 Tegal students?
3. Is there a significant influence of professional competence and pedagogic competence of teachers together on the numeracy literacy of class XI MAN 1 Tegal students?

In line with the above problem questions, the objectives of this study are as follows:

1. To be able to find out the influence of teacher professional competence on the numeracy literacy of students of class XI MAN 1 Tegal.
2. To be able to find out the influence of teacher pedagogic competence on the numeracy literacy of class XI students at MAN 1 Tegal.
3. To be able to find out the influence of professional competence and pedagogic competence of teachers together on the numeracy literacy of students of class XI MAN 1 Tegal.

2. Method



In accordance with the above framework of thought scheme, the hypotheses proposed in this study are as follows:

1. Ha1: There is a significant influence of professional competence with the numeracy literacy of class XI MAN 1 Tegal students for the 2021/2022 Academic Year.
2. H01: There is no significant influence of professional competence with the numeracy literacy of class XI MAN 1 Tegal students for the 2021/2022 Academic Year.

3. Ha2: There is a significant influence of pedagogic competence with the numeracy literacy of class XI MAN 1 Tegal students for the 2021/2022 Academic Year.
4. H02: There is no significant influence of pedagogic competence with numeracy literacy of class XI MAN 1 Tegal students for the 2021/2022 Academic Year.
5. Ha3: There is a significant influence of professional competence and pedagogic competence of teachers together on the numeracy literacy of class XI MAN 1 Tegal students for the 2021/2022 Academic Year.
6. H03: There is no significant influence of professional competence and pedagogic competence of teachers together on the numeracy literacy of students of class XI MAN 1 Tegal academic year 2021/2022.

The kind of data, how the data is collected, with the instruments by which the data is collected and how it is collected. The data collection technique that the author used in this study was by the questionnaire collection method for data on professional competence and pedagogic competence as well as documentation for numeracy literacy data which was taken from the results of the ANBK tryout numeracy literacy. To calibrate the instrument of professional competence and pedagogic competence of teachers used by testing the validity of each question item, and the reliability of the instrument.

In this study, the data analysis used was descriptive statistical analysis, analysis prerequisite tests (normality test, linerity test, multicholinearity test, heteroskedasticity test) and hypothesis test (simple correlation analysis, simple regression analysis, multiple correlation analysis, multiple regression analysis, F-test).

3. Result

Respondents in this study were 213 students. The proportion of sampling uses the proportional random sampling formula or the multilevel sampling formula.

Table 1. Convergent Validity Test Results

No	Class	Number of Learners	Number of Samples
1	XI Science	222	222/454 x 213 = 104
2	XI Social Science	164	164/454 x 213 = 77
3	XI Religion	68	68/454 x 213 = 32
		454	213

Statistical descriptive analysis gives an overview of a data. Descriptive analysis describes a summary of research data seen from the average value (mean), standard deviation, variance, maximum value, minimum value, sum, and range. Dissemination of questionnaires on 213 research samples of class XI MAN 1 Tegal with items of 20 statements about professional competence and pedagogical competence of teachers.

This study aims to test the influence of free variables on bound variables. The prerequisite tests in this study consist of data normality tests, data linearity tests, data multicholinerita tests, and data heteroskedasticity tests. The Normality Test aims to find out whether the data is distributed normally or not. Data normality is a mandatory condition that must be met in parametric analysis. Data normality is important because with normally distributed data, the data is considered to be representative of the population. In this study, normality testing uses the SPSS 26 program, which is used to make it easier to calculate data. In this study, the

author used the liliefors test for normality tests. The results of the normality test can be seen in the output test of normality, in the Kolmogorv-Smirnov column on the Sig value. (significant). Based on the calculation results of the Kolmogorov-Smirnov column on the sig column. (signification), it is known that professional competency data and teacher pedagogical competency data and student numeracy literacy are normally distributed.

The linearity test is used to determine whether the two variables have a linear relationship or not. This test is performed by looking for the equation of the regression line of a free variable against a bound variable. The author uses the SPSS version 2.6 program for linearity tests that "testing on SPSS using tests for linearity at a significance level of 0.05". If the significance value at linearity is less than 0.05 (Sig < 0.05), then the two variables are said to have a linear relationship.

The final analysis results in this study consist of the results of simple correlation analysis, simple regression analysis, double regression analysis, double correlation analysis, determination test, and coefficient test regression together (test F). Relationship analysis (correlation) is a form of data analysis in research that aims to find out the strength or shape of the direction of the relationship between two or more variables, and the magnitude of the influence caused by one variable (free variable) against another variable (bound variable). Priyatno (2016:39) states a simple correlation analysis is used as a way to find out the relationship between two or more variables that indicate significant closeness, direction and relationship or not. The basis for making correlation decisions is that if the value of Sig. > 0.05, then H0 is accepted. Conversely, if the sig value < 0.05, then H0 is rejected. A simple regression analysis is a regression analysis that involves only two variables, namely one free variable and one bound variable. Testing this regression coefficient using the t Test. Simple regression analysis is used to answer hypotheses number 1 and 2.

Double correlation analysis is used to determine the relationship between two or more free variables (X) and bound variables (Y) together. To perform the double correlation analysis, the authors used the help of the SPSS program version 26.Based on the calculation of multiple correlation analysis obtained the value of double correlation R located between 0.60–0.799 so that it can be stated that there is a strong relationship between professional competence and pedagogical competence of teachers with the literacy ability of students.

Multiple regression analysis is a linear relationship between two or more free variables and bound variables. In this study, the analysis was used to determine the influence of professional competence and pedagogic competence of teachers together on the numeracy literacy of students. Multiple regression can be analyzed because it is based on a functional relationship or causal (causal) relationship between two variables (X1) and (X2) with one bound variable (Y). To perform a double correlation analysis, the author uses the help of the SPSS version 2.6 program, based on the results of data processing, it can be analyzed as follows:

$$\hat{Y} = a + b1X1 + b2X2$$

where:
$\hat{Y}$: projected bound variable
X: free variable
a: the value of the price constant Y if X=0
b: directional value as a determinant of the forecast of the value of the variable Y

1. The value of the regression coefficient of the professional competency variable (X1) is positive, meaning that there is a positive relationship between professional competence

(X1) and the numeracy literacy of students (Y). The more the professional competence of teachers, the more numeracy literacy results of students increase.

2. The value of the regression coefficient of the pedagogic competency variable (X2) is positive, meaning that there is a positive relationship between pedagogic competence (X1) and the numeracy literacy of students (Y). The more pedagogical competence of teachers increases, the more numeracy literacy results of students increase.

Regression Coefficient Test (F Test)

The F test aims to find out whether the free variables together have a significant effect on the bound variables. Based on the calculation of the F value data, calculate > Ftable and the significance of the < 0.05, H03 is rejected, which means that professional competence and pedagogical competence of teachers are together have a significant effect on the numeracy literacy of learners.

4. Conclusion

Based on the result above, researcher conclude that.

1. There is a significant influence between the professional competence of teachers and the numeracy literacy of students of class XI MAN 1 in the 2021/2022 Academic Year. This is proved from the first hypothesis testing obtaining the calculated t value > t of thetable.
2. There is a significant influence between the pedagogical competence of teachers and the numeracy literacy of class XI MAN 1 students in the 2021/2022 Academic Year. This is proved from the first hypothesis testing obtaining the calculated t value > t of thetable.
3. Testing the professional competency variables (X1) and pedagogic competency variables (X2) together on the numeracy literacy variables of students (Y) obtained results that there was an influence which is significant between professional competence and pedagogic competence with numeracy literacy of students of class XI MAN 1 Tegal Academic Year 2021/2022

From this research, the following suggestions can be proposed: teachers should increase their intensity in developing ways of managing the learning process, developing knowledge about the latest literacy phenomena both reading literacy, numeracy literacy or science literacy, and fostering the interest of students to be motivated to learn, especially in the formal education environment. Madrasahs can provide learning facilities and infrastructure to support the learning process , for example by providing IT networks and the internet so that teachers and students can always update information. The head of the madrasa can obtain information about the professional competence and pedagogical competence of the teacher, so that he can periodically evaluate and take appropriate actions to improve competence of his fostered teachers. For further research, you can develop another one by adding variables or other explanatory variables.

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