THE RELATIONSHIP BETWEEN NUMERICAL ABILITY, DISCIPLINE OF STUDENT AND INTEREST OF LEARNING WITH STUDENTS MATHEMATICS LEARNING OUTCOMES IN CLASS VII

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ABSTRACT

Low student learning outcomes related to a variety of factors. Numerical ability, the discipline of a student, and interest in learning a few factors relate to learning outcomes. This research aims to know if there is a real and significant of relationship numerical ability, the discipline of a student, and interest of learning with students mathematics learning outcomes in class VII in Muhammadiyah Junior High School 9 Yogyakarta (SMP Muhammadiyah 9 Yogyakarta) regency of even semester in the academic year of 2016/2017. The sample population in SMP Muhammadiyah 9 Yogyakarta in the academic year 2016/2017 consists of 5 classes. A sample class is a class VII A with using random sampling. The technique of the data collection method a questionnaire method and the test method. Data collection instruments using a numerical ability test, questionnaires discipline of student, questionnaires interest of learning, and mathematics achievement test. Test research instruments used validity, different test power, and reliability test. Analysis prerequisite test, including normality test, linearity test, and independent test. Data analysis for hypothesis testing using simple correlation analysis and multiple regression analysis. The results showed a positive and significant relationship between numerical ability, the discipline of a student, and interest in learning of mathematics learning outcomes. The significant level of 5%, $v_1 = 3, v_2 = 27, F_{count} = 26{,}929$ and $F_{table} = 2{,}960, F_{count} > F_{table}$ with multiple correlation coefficient of R = 0,866, and multiple regression equation their variables is $\hat{Y} = -44{,}401 + 0{,}700\, X_1 + 0{,}534\, X_2 + 0{,}006 X_3$. Donations are relatively X_1=60,958%, X_2=38,846%, X_3=0,196%, with multiple determination coefficient of 0,750 and the effective contribution X_1=45,688%, X_2=29,115%, X_3=0,147%.

Keywords: Numerical Ability, Discipline of Student, Interest of Learning, Mathematics Learning Outcomes.

INTRODUCTION

The level of educational success determines the progress of a nation. The success of education will be achieved by a nation if there is an effort to improve the quality of education. Education is an effort to mature and independence people through planned activities and realized through learning and learning activities that involve students and teachers. Education is one of the important sectors in national development. The success of education in schools is characterized by an active learning process with students' involvement physically, mentally, and emotionally. Mathematics learning requires teachers to manage the teaching and learning process so that student involvement can be optimal and impact student learning outcomes. Several factors influence learning, especially mathematics, namely internal factors and external factors. Internal factors include interests, motivation, talents, and others as external factors, including parental attention, learning facilities, school environment, family environment, community environment, and others. One internal factor is the numerical ability. According to Ketut, Dewa Sukardi (2003: 122), numbers are the ability of students to reason with numbers, use or manipulate relationships with numbers, and logically describe the amount of material. Numerical ability is needed to solve mathematical problems.

Based on an interview with a mathematics subject teacher at SMP Muhammadiyah 9 Yogyakarta, Mrs. Siti Nurhanifah on November 4, 2016, results were obtained, students were still having difficulty in counting and operating numbers, and still made mistakes in operating numbers. As a result of these difficulties, the impact on student learning outcomes is low, and the numerical ability that is thought to

influence student learning outcomes, namely student discipline. Based on the results of apprenticeship observations in August 2016, the level of student discipline was still low. It can be seen from students' preparation when math lessons will begin, student behavior when the teacher is explaining, giving assignments, when repeating, and after learning in addition to the numerical ability and discipline of those students who are suspected to influence student learning outcomes, namely interest in learning. Based on an interview on November 4, 2016, with a mathematics subject teacher, there was still a lack of student interest in learning. It can be seen from the lack of active students in mathematics when the teacher gives practice questions, the lack of understanding of the material that results in the test results are still low, and students who are lazy to work on the problems. The results of observations and interviews in August 2016 with some VII grade students stated that they did not like mathematics due to a large number of mathematical formulas, the difficulty of memorizing mathematical formulas, difficult material. The opinions of these students caused students to lack interest in learning mathematics. The following is data that can give a concrete picture of the mathematics learning outcomes of the Semester (Midterm), even semester VII grade students of Muhammadiyah 9 Yogyakarta Middle School 2016/2017 Academic Year.

Table 1. Middle Semester Mathematics Assessment of Grade VII students Muhammadiyah 9 Yogyakarta Middle School Even Semester

	Class					Percentage
	A	B	C	D	E	
Highest score	74	79	71	82	72	-
Lowest score	20	22	17	19	18	-
Average	49,097	56,875	50,813	49,813	44,125	-
Total students	31	32	32	32	32	100%
Complete	2	7	2	6	5	13,836%
No Complete	29	25	30	26	27	86,164%

Data source: SMP Muhammadiyah 9 Yogyakarta Tahun 2016/2017

Minimum Completeness Criteria (MCC) for mathematics class VII in SMP Muhammadiyah 9 Yogyakarta is 70. The percentage of students who have not completed MCC is 86.164%, and the percentage of students who have completed MCC is 13.836%. This shows that the learning outcomes of Grade VII students are still low. Based on the description above, the writer will research The Relationship of Numerical Ability, Student Discipline, and Student Learning Interest with Mathematics Learning Outcomes of Class VII Students of SMP Muhammadiyah 9 Yogyakarta Even Semester 2016/2017 Academic Year.

Based on the description above, the research problem can be formulated as follows: 1) Is there a positive and significant relationship of numerical ability with mathematics learning outcomes of VII grade students of SMP Muhammadiyah 9 Yogyakarta even semester 2016/2017 Academic Year? 2) Is there a positive and significant relationship between student discipline and mathematics learning outcomes for Grade VII students of SMP Muhammadiyah 9 Yogyakarta, even semester 2016/2017 Academic Year? 3) Is there a positive and significant relationship of interest in learning with mathematics learning outcomes for students of class VII SMP Muhammadiyah 9 Yogyakarta, even semester 2016/2017 Academic Year? 4) Is there a positive and significant relationship of numerical ability and student discipline with mathematics learning outcomes for students of grade VII of SMP Muhammadiyah 9 Yogyakarta, even semester 2016/2017 Academic Year? 5) Is there a positive and significant relationship of numerical ability and interest in learning with mathematics learning outcomes of Grade VII students of SMP Muhammadiyah 9 Yogyakarta even semester 2016/2017 Academic Year? 6) Is there a positive and significant relationship of student discipline and learning interest with mathematics learning outcomes of Grade VII students of SMP Muhammadiyah 9 Yogyakarta, even semester 2016/2017 Academic Year? 7) Is there a positive and significant relationship of numerical ability, student discipline, and interest in learning with mathematics learning outcomes of Grade VII students of SMP Muhammadiyah 9 Yogyakarta even semester 2016/2017 Academic Year?

Based on the problem formulation, the objectives of this study are 1) To determine whether or not there is a positive and significant relationship of numerical ability with mathematics learning outcomes of Grade VII students of SMP Muhammadiyah 9 Yogyakarta even semester 2016/2017 Academic Year. 2) To determine whether or not there is a positive and significant relationship between student discipline and mathematics learning outcomes for Grade VII students of SMP Muhammadiyah 9 Yogyakarta even semester 2016/2017 Academic Year. 3) To determine whether or not there is a positive and significant relationship of interest in learning with mathematics learning outcomes of Grade VII students of SMP Muhammadiyah 9 Yogyakarta even semester 2016/2017 Academic Year. 4) To determine whether or not there is a positive and significant relationship of numerical ability and student discipline with mathematics learning outcomes of Grade VII students of SMP Muhammadiyah 9 Yogyakarta even semester 2016/2017 Academic Year. 5) To determine whether or not there is a positive and significant relationship of numerical ability and interest in learning with mathematics learning outcomes of Grade VII students of SMP Muhammadiyah 9 Yogyakarta even semester 2016/2017 Academic Year. 6) To determine whether or not there is a positive and significant relationship between student discipline and interest in learning with mathematics learning outcomes of Grade VII students of SMP Muhammadiyah 9 Yogyakarta even semester 2016/2017 Academic Year. 7) To find out whether or not there is a positive and significant relationship of numerical ability, student discipline, and interest in learning with mathematics learning outcomes of Grade VII students of SMP Muhammadiyah 9 Yogyakarta even semester 2016/2017 Academic Year.

METHODS

This research is quantitative. The research site was carried out at Muhammadiyah 9 Junior High School in Yogyakarta, while the research was conducted in the even semester of the 2016/2017 school year. The population in this study were all VII grade students of SMP Muhammadiyah 9 Yogyakarta even semester 2016/2017 academic year consisting of 5 classes arranged randomly, namely classes VII A, VII B, VII C, VII D, and VII E. The samples and class trials were taken randomly using random sampling techniques to the class that is taken one class, one class randomly. Sampling class is obtained by lottery class, and class VII A is obtained as a sample class and class VII C as a trial class.

In this study, there are two kinds of research variables: the independent and dependent variables. The independent variables in this study consisted of numerical ability (X_1), student discipline (X_2), and interest in learning (X_3), while the dependent variable in this study was mathematics learning outcomes (Y). Data collection techniques used were questionnaires and test methods. In this study, the questionnaire method was used to obtain data on student discipline and interest in learning. The test method is used to obtain data about numerical abilities and mathematics learning outcomes of Grade VII students of Yogyakarta Muhammadiyah 9 Middle School. Analysis of questionnaire instruments and questions using content validity tests by reviewers and product-moment correlation techniques (Arikunto, Suharsimi, 2005: 72). To test the power of discrimination using the discrimination index formula (Arikunto, Suharsimi, 1981: 157-158). As for the reliability test, the questionnaire instrument used the alpha formula (Arikunto, Suharsimi, 2013: 239), and the test used the KR-20 formula (Arikunto, Suharsimi, 2005: 100-101). After the data has been collected, descriptive data analysis, analysis prerequisite tests, and hypothesis testing are carried out. Analysis prerequisite tests include normality tests using the chi-square formula, linearity test, and independence test. To test the hypothesis using the t-test and F-test, use the formula:

$$t = \frac{r\sqrt{n-2}}{\sqrt{1-r^2}}$$

with :

r = correlation coefficient

n = lots of samples

For the F-test (Sugiyono, 2009: 286) using the formula:

$$F = \frac{R^2(N-m-1)}{m(1-R^2)}$$

With:

F = F price regression

R^2 = coefficient of double determination

N = sample size

m = number of independent variables

RESULTS AND DISCUSSION

From the results of the study of the instrument stated that the instrument is feasible to be presented or distributed to be filled by respondents. For the instrument test analysis, based on the test of the validity of the numerical ability test, it was obtained that from 25 items 21 items were declared valid, and for the mathematics learning achievement test, it was found that from 24 items 20 items were declared valid, as seen in Table 2

Table 2. Summary of Calculation Results for Validity Test in Numerical Ability Test and Mathematics Learning Outcomes

Instrument	Valid Amount	Number of questions dropped	Item number dropped
Numerical Ability	21	4	1, 2, 8, 12
Mathematical learning outcomes	20	4	1, 2, 12, 19

Furthermore, based on the numerical ability differentiation test, it was found that from 21 items, there was 1 item with excellent criteria, five items with good criteria, and 15 items with sufficient criteria. For the test of distinguishing power tests on mathematics learning outcomes, it is found that from 20 items, there are two items with good criteria and 18 items with sufficient criteria, as shown in Table 3.

Table 3. Summary of Distinguishing Power Test Results

Variable	Criteria	No Item Question
Numerical Ability	Very well	25
	Well	6, 15, 18, 20, 22
	Enough	3, 4, 5, 7, 9, 10, 11, 13, 14, 16, 17, 19, 21, 23,24
	Ugly	-
	Less	-
Mathematical learning outcomes	Very well	-
	Well	3, 24
	Enough	4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15, 16, 17, 18, 20, 21, 22, 23
	Ugly	-
	Less	-

Henceforth, based on the reliability test, it is stated that the numerical ability instrument, student discipline, and interest in learning, have high criteria. The mathematics learning achievement test instrument has sufficient criteria, as shown in Table 4.

Table 4. Summary of Instrument Reliability Test Results

Research variable	r_{count}	Criteria
Research variable (X_1)	0,825	High
Student Discipline (X_2)	0,836	High
Interest to learn (X_3)	0,875	High
Mathematical Learning Outcomes (Y)	0,749	Enough

For the prerequisite test analysis on the normality test, it was found that the four variables, namely numerical ability, student discipline, learning interest, and learning outcomes in mathematics, are normally distributed, as shown in Table 5.

Table 5. Summary of Normality Test Results

Variable	χ^2_{count}	χ^2_{table}	df	Info.
Research variable (X_1)	4,672	7,8147	3	Normal
Student Discipline (X_2)	4,464	7,8147	3	Normal
Interest to learn (X_3)	1,049	7,8147	3	Normal
Mathematical Learning Outcomes (Y)	2,739	7,8147	3	Normal

Next, based on the linearity test, it was found that between numerical ability variables with mathematics learning outcomes, student discipline with mathematics learning outcomes, and learning interest with mathematics learning outcomes have a linear relationship shown in Table 6.

Table 6. Summary of Linearity Test Results

Variable	F_{count}	F_{table}	Info.
(X_1) with (Y)	1,180	2,38	Linier
(X_2) with (Y)	0,821	2,58	Linier
(X_3) with (Y)	1,504	2,58	Linier

Next, based on the independence test, it was found that the numerical ability variable with student discipline, numerical ability with interest in learning, and student discipline with interest in learning were independently related, as seen in Table 7.

Table 7. Summary of Independence Test Results

Variable	X^2_{count}	X^2_{table}	df	Info.
(X_1) with (X_2)	36,895	37,6525	25	Independent
(X_1) with (X_3)	33,711	37,6525	25	Independent
(X_2) with (X_3)	27,776	37,6525	25	Independent

To test the hypothesis of the first hypothesis test results, it was found that there was a positive and significant relationship between numerical ability and mathematics learning outcomes. The results of this study were obtained $t_{count} = 7.663$ and $t_{table} = 1.6991$ at a significant 5% level with a simple correlation coefficient (r) of 0.818. This can be explained through a linear relationship $\widehat{between}\, Y = -11{,}585 + 1{,}025\, X_1$. This means that every increase of one unit X_1 results in a 1.025 increase in Y; in other words, if the numerical ability is high, the mathematics learning outcomes will increase.

From the results of the second hypothesis test, it is found that there is a positive and significant relationship between student discipline and mathematics learning outcomes. The results of this study were obtained $t_{count} = 6.330$ and $t_{table} = 1.6991$ at a significant level of 5% with a simple correlation coefficient (r) of 0.761. This can be explained through a linear relationship $\hat{Y} = -59{,}144 + 1{,}062\, X_2$. This means that every increase of one unit X_2 increases 1,062 Y; in other words, if student discipline is high, the mathematics learning outcomes will be even higher.

From the results of the third hypothesis test, it is found that there is a positive and significant relationship between learning interest and mathematics learning outcomes. The results of this study were obtained $t_{count} = 2.571$ and $t_{table} = 1.6991$ at a significant level of 5% with a simple correlation coefficient (r) of 0.431. This can be explained through a linear relationship $\hat{Y} = -33{,}714 + 0{,}819\, X_3$. This means that every increase of one unit of X_3 results in a 0.819 increase of Y, in other words, if the interest in learning is high, then the results of learning mathematics will be higher.

From the fourth hypothesis, test results obtained that there is a positive and significant relationship between numerical ability and student discipline with mathematics learning outcomes. The results of this study were obtained $F_{count} = 41.888$ and $F_{tabel} = 3.340$ at a significant level of 5% with

a double correlation coefficient (*R*) of 0.866. This can be explained through a linear relationship $\hat{Y} = -44{,}513 + 0{,}702\,X_1 + 0{,}535\,X_2$. This means that every increase of one unit X_1 results in a 0.702 increase in Y, and every increase in one unit X_2 results in a 0.535 increase in Y. While the relative contribution of X_1 is 61,143%, and X_2 is 38,857%. Effective contribution X_1 is 45.826% and X_2 is 29,123%. From the results of these calculations, it can be seen that by increasing students' numerical ability and discipline, mathematics learning outcomes will increase.

The results of the fifth hypothesis test found that there is a positive and significant relationship between numerical ability and interest in learning with mathematics learning outcomes. The results of this study were obtained $F_{count} = 28.387$ and $F_{tabel} = 3.340$ at a significant level of 5% with a double correlation coefficient (*R*) of 0.818. This can be explained through a linear relationship. This means that each increase of one unit X_1 results in 1,017 increases in Y, and every increase in one unit X_3 results in 0.023 increases in Y. While the relative contribution of X_1 is 99.215%, and X_3 is 0.785%. The effective contribution X_1 is 66.445%, and X_3 is 0.526%. From the results of these calculations, it can be seen that by increasing numerical ability and interest in learning, mathematics learning outcomes will increase.

From the sixth hypothesis test results obtained that there is a positive and significant relationship between student discipline and interest in learning with the results of learning mathematics. The results of this study were obtained $F_{count} = 21.510$ and $F_{tabel} = 3.340$ at a significant level of 5% with a double correlation coefficient (*R*) of 0.778. This can be explained through a linear relationship $\hat{Y} = -79{,}806 + 0{,}972\,X_2 + 0{,}336\,X_3$. This means that every increase of one unit X_2 results in a 0.972 increase in Y, and every increase in one unit X_3 results in 0.336 increase in Y. While the relative contribution of X_2 is 87.406%, and X_3 is 12.594%. Effective contribution of X_2 is 52,946% and X_3 is 7,629%. From the results of these calculations, it can be seen that by increasing student discipline and interest in learning, mathematics learning outcomes will increase.

From the results of the seventh hypothesis test obtained that there is a positive and significant relationship between numerical ability, student discipline, and interest in learning with mathematics learning outcomes. The results of this study were obtained $F_{count} = 26.929$ and $F_{tabel} = 3.340$ at a significant level of 5% with a double correlation coefficient (*R*) of 0.866. This can be explained through a linear relationship. This means that each increase of one unit X_1 increases 0,700 Y increases, every increase of one unit X_2 results in 0.534 increases Y, and every increase of one unit X_3 causes 0.006 increases Y. While the relative contribution of X_1 is 60,958%, X_2 is 38,846% and X_3 is 0,196% . Effective contribution X_1 is 45,688%, X_2 is 29,123% and X_3 is 0,147%. From the results of these calculations, it can be seen that by increasing numerical ability, student discipline, and interest in learning, mathematics learning outcomes will increase. Its double determination coefficient is 0.750, and this proves that mathematics learning outcomes are related to numerical ability, student discipline, and interest in learning by 75.0%. In comparison, 25.0% is related to other factors not discussed in this study.

CONCLUSION

Based on the results of research and discussion, the following research conclusions can be drawn:

1. There is a positive and significant relationship between numerical ability and mathematics learning outcomes of Grade VII students of SMP Muhammadiyah 9 Yogyakarta, even semester 2016/2017 academic year. The t-test indicates this. Namely, $t_{count} > t_{table}$ or $7.666 > 1.6991$. The simple correlation coefficient (*r*) between numerical ability and mathematics learning outcomes is 0.818 with a linear regression equation $\hat{Y} = -11.585 + 1.025\,X_1$.
2. There is a positive and significant relationship between student discipline and mathematics learning outcomes for VII grade students of SMP Muhammadiyah 9 Yogyakarta, even semester 2016/2017 academic year. This is indicated by the t-test that is $t_{count} > t_{table}$ or $6.310 > 1.6991$. The simple correlation coefficient (*r*) between numerical ability and mathematics learning outcomes is 0.818 with a linear regression equation $\hat{Y} = -59.144 + 1.062\,X_2$.
3. There is a positive and significant relationship between interest in learning with mathematics learning outcomes for students of class VII at Muhammadiyah 9 Yogyakarta Middle School in the even

semester of the 2016/2017 school year. The t-test indicates this; namely, $t_{count} > t_{table}$ or $2.571 > 1.6991$. The simple correlation coefficient (*r*) between numerical ability and mathematics learning outcomes is 0.413 with a linear regression equation $\hat{Y} = -33.714 + 0.819\, X_3$.

4. There is a positive and significant relationship between numerical ability and student discipline with mathematics learning outcomes for Grade VII students of SMP Muhammadiyah 9 Yogyakarta, even semester 2016/2017 academic year. The F-test indicates this, i.e., $F_{count} > F_{table}$ or $41.888 > 3.340$. The multiple correlation coefficient (*R*) between numerical ability and student discipline with mathematics learning outcomes is 0.886 equal to multiple linear regression equations$\hat{Y} = -44{,}513 + 0{,}702\, X_1 + 0{,}535\, X_2$, with a relative contribution of X_1 of 61,143% and X_2 of 38,857% and effective contribution of X_1 of 45.826% and X_2 of 29,123%.
5. There is a positive and significant relationship between numerical ability and interest in learning with mathematics learning outcomes of Grade VII students of SMP Muhammadiyah 9 Yogyakarta, even semester 2016/2017 academic year. The F-test indicates this, i.e., $F_{count} > F_{table}$ or $28.387 > 3.340$. The multiple correlation coefficient (R) between numerical ability and learning interest with mathematics learning outcomes is 0.818 with multiple linear regression equations $\hat{Y} = -13{,}200 + 1{,}107\, X_1 + 0{,}023\, X_3$, with a relative contribution of X_1 of 99.215% and X_3 of 0.785% and effective contribution of X_1 of 66.445% and X_3 of 0.526%.
6. There is a positive and significant relationship between student discipline and interest in learning with mathematics learning outcomes for students of grade VII of SMP Muhammadiyah 9 Yogyakarta, even semester 2016/2017 academic year. The F-test indicates this, i.e., $F_{count} > F_{table}$ or $22.510 > 3.340$. The multiple correlation coefficient (*R*) between student discipline and learning interest with mathematics learning outcomes is 0.778 with multiple linear regression equations $\hat{Y} = -79{,}806 + 0{,}972\, X_2 + 0{,}336\, X_3$, with a relative contribution of X_2 of 87.406% and X_3 of 12.594% and effective contribution of X_2 of 52.946% and X_3 of 7.629%.
7. There is a positive and significant relationship between numerical ability, student discipline, and interest in learning with mathematics learning outcomes of Grade VII students of SMP Muhammadiyah 9 Yogyakarta, even semester 2016/2017 academic year. The F-test indicates this, i.e., $F_{count} > F_{table}$ or $26.929 > 3.340$. The multiple correlation coefficient (R) between numerical ability, student discipline and learning interest with mathematics learning outcomes is 0.866 and (R^2) is 0.750 with multiple linear regression equations $\hat{Y} = -44.401 + 0.700\, X_1 + 0.534\, X_2 + 0.006\, X_3$, with a relative contribution of X_1 of 60.958%, a relative contribution of X_2 of 38.846% and a relative contribution of X_3 of 0.196%. Effective contribution X_1 is 45.668%, effective contribution X_2 is 29.115% and effective contribution X_3 is 0.147%.

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