THE RELATIONSHIP BETWEEN NUMERICAL ABILITY, LEARNING MOTIVATION, AND UTILIZATION OF LEARNING RESOURCES MATHEMATICS LEARNING OUTCOMES OF EIGHTH GRADE STUDENTS

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ABSTRACT

Results of low mathematics associated with many factors. Numerical ability, learning motivation, and utilization of learning resources are several factors that allegedly associated with students' mathematics study learning outcomes. This research aims to determine whether or not a positive and significant relationship between Numerical Ability, Learning Motivation, and Utilization of Learning Resources with Mathematics Learning Outcomes of Eighth Grade Students Even Semester Muhammadiyah Junior High School 1 Yogyakarta (SMP Muhammadiyah 1 Yogyakarta) in Academic Year 2016/2017. The population used in this research is all of the eighth-grade students, even semester SMP Muhammadiyah 1 Yogyakarta, in the academic year 2016/2017 with the total number of 194 students and divided into seven classes. Sampling class using accidental sampling technique to the class, so that obtained class VIII B. Data collection techniques using test method and the questionnaire method. Test prerequisite analysis using the normality test, independent test, and the linearity test. Analysis of data used linear regression analysis and correlation analysis. The results showed a positive and significant relationship between numerical ability, learning motivation, and utilization of learning resources with mathematics study results with $F_{count} = 22{,}7928$ and $F_{table} = 3{,}10$, too, obtain $F_{count} > F_{table}$. Multiple correlation coefficient (R) of $0{,}8796$ with a learn regression equation $\hat{Y} = -6{,}721 + 0{,}382\,X_1 + 0{,}489\,X_2 + 0{,}131\,X_3$. Relative contribution of $X_1 = 33{,}8047\%$, $X_2 = 56{,}9407\%$, and $X_3 = 9{,}2546\%$ with coefficient of determination was $0{,}7737$ and affective contribution $X_1 = 26{,}1547\%$, $X_2 = 44{,}0550\%$, and $X_3 = 7{,}1603\%$.

Keywords: Numerical Ability, Learning Motivation, Utilization of Learning Sources, The Result of Learning Mathematics.

INTRODUCTION

Education is vital in human life, especially in the current era of globalization. To keep pace with the pace of development in the era of globalization, the Indonesian people are required to continue developing science and technology. It aims to produce quality human resources. Education in Indonesia is divided into three main lines: formal education, non-formal education, and informal education. Formal education is an educational path that is commonly used by the community. The formal education pathway has a structured and transparent level, starting from primary education, secondary education, and higher education. The success of an education system can be seen from the results of student learning. High or low student learning outcomes can be influenced by factors that originate from within students (internal) and factors that come from outside of students (external). Internal factors include interests, talents, motivation, verbal abilities, numerical abilities, and independence. At the same time, external abilities include the environment, learning, parenting, parental circumstances, teaching atmosphere, personal and teacher attitudes, teacher competencies, community, and many more.

Mathematics is one of the subjects that must be followed in each formal education path in stages, from necessary materials to more in-depth material. In solving mathematical problems, several abilities are needed, one of which is the fundamental ability to solve problems in mathematics, namely numerical ability. Numerical ability is needed in solving problems in mathematics.

Based on the results of interviews with mathematics teachers of class VIII on December 6, 2016, at SMP Muhammadiyah 1 Yogyakarta, stated that student learning outcomes in mathematics are still relatively low. This can be seen in Table 1, the average math scores of students in the Mathematics Middle Semester class VIII Odd Semester SMP Muhammadiyah 1 Yogyakarta 2016/2017 Academic Year with Minimum Completeness Criteria (MCC) is 76.

Table 1. Grades of Final Test for Odd Semester Grade SMP VIII Muhammadiyah 1 Yogyakarta in 2016/2017 Academic Year

Class	Total students	Mean	Score ≥ 76	Score < 76
A	26	60,48	8	18
B	23	29,13	0	23
C	33	55,70	0	33
D	27	45,46	1	26
E	28	34,20	0	28
F	30	35,17	0	30
G	28	35,09	0	28

(Source: SMP Muhammadiyah 1 Yogyakarta)

From Table 1 above, it can be seen that there are still many Final Mathematics Examinations in Odd Semester Students of Class VIII at SMP Muhammadiyah 1 Yogyakarta2016/2017 Academic Year not achieving the Minimal Completeness Criteria (MCC). According to mathematics teacher class VIII, the low student learning outcomes are not only due to the low numerical ability of students, but also the low willingness or desire of students to re-learn the material that has been delivered. Low student learning outcomes are also caused by many students who do not understand the concepts of the material being taught. Also, students have difficulty in understanding many formulas consisting of symbols and symbols.

Based on the results of an interview from a mathematics teacher in class VIII on December 6, 2016, students will compete to come to the front of the class if given a problem with a relatively easy level. However, if given other questions with a more challenging level, none of them want to advance to solve the problem. From this, it can be seen that the low motivation to learn students is because there is no desire of students to try to solve mathematical problems with a more challenging level.

Based on observations and interviews at SMP Muhammadiyah 1 Yogyakarta, class VIII uses mathematics learning resources such as worksheets, textbooks, and the internet. Student Worksheet is a learning resource made by the subject teacher in the form of sheets and adjusted to the material discussed. According to mathematics teachers in class VIII, the existing mathematics learning resources still need to be added to optimize student learning outcomes. So from several results; observations and interviews, it can be concluded that from the odd semester of score data of final exam there are still many students who have not yet reached the Minimal Completeness Criteria (MCC), students numerical ability is still low, students desire to repeat the material is still low, the low desire of students to try to solve math problems with a higher level of difficulty, student motivation is still low, and the use of mathematics learning resources that are not optimal.

Based on the background of the problems that have been raised, the following research problems can be formulated:

1. Is there a positive and significant relationship between numerical ability and mathematics learning outcomes of VIII grade students of SMP Muhammadiyah 1 Yogyakarta, even semester 2016/2017 academic year?
2. Is there a positive and significant relationship between learning motivation and mathematics learning outcomes of VIII grade students of SMP Muhammadiyah 1 Yogyakarta, even semester 2016/2017 academic year?
3. Is there a positive and significant relationship between the use of learning resources and mathematics learning outcomes of students of class VIII of SMP Muhammadiyah 1 Yogyakarta, even semester 2016/2017 academic year?

4. Is there a positive and significant relationship between numerical ability and motivation to learn with mathematics learning outcomes of eighth-grade students of SMP Muhammadiyah 1 Yogyakarta even semester 2016/2017 academic year?
5. Is there a positive and significant relationship between numerical ability and the use of learning resources with mathematics learning outcomes of students of class VIII of SMP Muhammadiyah 1 Yogyakarta even semester 2016/2017 academic year?
6. Is there a positive and significant relationship between learning motivation and the use of learning resources with mathematics learning outcomes of eighth-grade students of SMP Muhammadiyah 1 Yogyakarta in the even semester of the 2016/2017 school year?
7. Is there a positive and significant relationship between numerical ability, learning motivation, and the use of learning resources with mathematics learning outcomes of students of class VIII of SMP Muhammadiyah 1 Yogyakarta even semester 2016/2017 academic year?

METHODS

This research is quantitative. The research was carried out at SMP Muhammadiyah 1 Yogyakarta, while the research was carried out in the even semester of the 2016/2017 school year. The population in this study were all eighth-grade students of SMP Muhammadiyah 1 Yogyakarta even semester 2016/2017 academic year as many as seven classes containing 194 students arranged randomly, namely class VIII A, VIII B, VIII C, VIII D, VIII E, VIII F, and VIII G. In this study sampling using the technique of accidental sampling of the class, namely sampling by chance (unplanned). Thus, it was found that Grade VIII B students were the sample classes. 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), learning motivation (X_2), and utilization of learning resources (X_3), while the dependent variable in this study was mathematics learning outcomes (Y). Data collection techniques used test methods and questionnaires. The test method in this study was used to determine the numerical ability and mathematics learning outcomes of VIII graders of the even semester of SMP Muhammadiyah 1 Yogyakarta in the 2016/2017 school year as the research sample. At the same time, the questionnaire method was used to obtain data on learning motivation and the use of learning resources for eighth-grade students in the even semester of SMP Muhammadiyah 1 Yogyakarta that became the research sample.

Analysis of the questionnaire instrument trials and tests using content validity tests by reviewers and product-moment correlation techniques (Arikunto, Suharsimi: 2012). To test the power of discrimination using the discrimination index formula (Arikunto, Suharsimi: 2010). Whereas for the reliability test, the questionnaire instrument used the Alpha formula (Arikunto, Suharsimi: 2012), and the test used the KR-20 formula (Arikunto, Suharsimi: 2012). After the data has been collected, descriptive data analysis, analysis prerequisite tests, and hypothesis testing are performed. Analysis prerequisite tests that must be met include normality tests using the chi-square formula (Sudjana: 2005), independent tests, and linearity tests. To test the hypothesis used t-test and F-test. For t-test (Sudjana: 2005) using the formula:

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

with:

t: The value to be compared

r: Correlation coefficient

n: Correlation coefficient

For the F-test (Sudjana: 2005) using the formula:

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

with:

m: The number of independent variables

n: Sample size

RESULTS AND DISCUSSION

The instrument study results stated that the instrument was feasible to be presented or distributed to be filled by the respondent. For the instrument trial analysis, based on the validity tests of numerical ability tests, it was found that from 25 items, 20 items were declared valid. The mathematics learning outcomes test obtained that from 25 items, there were 19 valid items, as seen in Table 2.

Table 2. Summary of Test Validity of Research Instruments

Variable	Number of Items	Number of Autumn Drops	Drop Item Number	Number of Valid Items
Numerical Ability	25	5	17, 19, 21, 23, 25	20
Mathematical Learning Outcomes	25	6	6, 9, 13, 17, 20, 25	19

Furthermore, based on the numerical ability differentiation test, it was found that from 20 valid items, there was 1 item with very good criteria, 11 items with good criteria, and eight items with enough categories. Whereas in the mathematics learning achievement test, it was found that from 19 valid items, there was 1 item with very good criteria, ten items with good criteria, and eight items with sufficient criteria. It can be seen that valid items also have criteria appropriate to be used, as seen in Table 3.

Table 3. Summary of the Test Power of Different Valid Item Instruments

Variable	Criteria			amount
	Very good	Good	Enough	
Numerical Ability	5	1, 2, 4, 7, 11, 12, 13, 15, 16, 22, 24	3, 6, 8, 9, 10, 14, 18, 20	20
Mathematical Learning Outcomes	7	1, 2, 3, 4, 11, 12, 15, 18, 19, 21	5, 8, 10, 14, 16, 22, 23, 24	19

Furthermore, based on the reliability test, it was stated that the numerical ability instrument, learning motivation, the use of learning resources, and reliable mathematics learning outcomes are seen in Table 4.

Table 4. Summary of Research Instrument Reliability Tests

Variable	Number of Items	r_{count}	r_{table}	Status
Numerical Ability	20	0,8924	0,4044	Reliable
Motivation to learn	25	0,8080	0,4044	Reliable
Use of Learning Resources	25	0,8624	0,4044	Reliable
Mathematical Learning Outcomes	19	0,8695	0,4044	Reliable

For the prerequisite test analysis on the normality test, it was found that numerical ability instruments, learning motivation, learning resource utilization, and mathematics learning outcomes were normally distributed, as shown in Table 5.

Table 5. Summary of Normality Test Results

Variable	X^2_{count}	X^2_{table}	df	Info
Numerical Ability (X_1)	0,2062	5,9915	2	Normal
Motivation to learn (X_2)	1,4309	5,9915	2	Normal
Use of Learning Resources (X_3)	2,3441	5,9915	2	Normal
Mathematical Learning Outcomes (Y)	1,5214	3,8415	1	Normal

Next based on the independent test it was found that between the numerical ability variable (X_1) and learning motivation (X_2), numerical ability (X_1) and the utilization of learning resources (X_3), as well as motivation to learn (X_2) and the utilization of learning resources (X_3) have an independent relationship, as seen in Table 6.

Table 6. Summary of Independent Test Results

Variable	X^2_{count}	X^2_{table}	df	Info
X_1 with X_2	29,6933	37,6525	25	Independent
X_2 with X_3	29,5095	37,6525	25	Independent
X_2 with X_3	22,5238	37,6525	25	Independent

Furthermore, based on the linearity test, it was found that between numerical ability variables (X_1) and mathematics learning outcomes (Y), learning motivation (X_2) and mathematics learning outcomes (Y), and the utilization of learning resources (X_3) and mathematics learning outcomes (Y) have a relationship linear ones, as seen in Table 7.

Table 7. Summary of Linearity Test Results

Variable	F_{count}	F_{table}	Info
X_1 with Y	0,9608	2,74	Linear
X_2 with Y	3,1187	3,92	Linear
X_3 with Y	1,2049	3,05	Linear

To test the hypothesis, the results of the first hypothesis test found a positive and significant relationship of numerical ability with mathematics learning outcomes with a simple correlation coefficient (r) of 0.7106, meaning that numerical ability with mathematics learning outcomes has a high relationship. This can be explained through a linear relationship $\hat{Y} = 12{,}8696 + 0{,}7749\, X_1$. This means that every increase of one unit X_1 results in a 0.7749 increase in Y; in other words, if the numerical ability is high, the students' mathematics learning outcomes will increase. This study also obtained a coefficient of determination (r^2) of 0.5050, which means 50.50% of mathematics learning outcomes are influenced by numerical ability, while other factors influence the rest. This calculation indicates that by increasing numerical ability, student mathematics learning outcomes will be better.

From the second hypothesis test results, it is found that there is a positive and significant relationship of students' learning motivation with students' mathematics learning outcomes with a simple correlation coefficient (r) of 0.7712, meaning that student's motivation to learn mathematics has a high relationship. This can be explained through a linear relationship $\hat{Y} = 14{,}1412 + 0{,}6922\, X_2$. This means that each increase in one unit of X_2 results in a 0.6922 increase in Y, in other words, if students 'motivation to learn is high, student's; mathematics learning outcomes will increase. This study also obtained a coefficient of determination (r^2) of 0.5948, which means that student learning motivation variables influence 59.48% of mathematics learning outcomes. In contrast, the rest is influenced by other factors. The results of this calculation indicate that by increasing student motivation, mathematics learning outcomes of students will be better.

From the fourth hypothesis, test results obtained that there is a positive and significant relationship of numerical ability and student motivation to learn mathematics learning outcomes with a second correlation coefficient (R) of 0.8703, meaning that numerical ability and student motivation to learn mathematics have a very high relationship. This can be explained by the linear relationship $\hat{Y} = -2{,}8683 + 0{,}4583\, X_1 + 0{,}4927\, X_2$. This means that every increase of one unit X_1 results in a 0.4583 increase in Y, and every increase in one unit X_2 results in a 0.4927 increase in Y, in other words, if numerical ability and student motivation are high then student mathematics learning outcomes will increase. This study also obtained a coefficient of determination (R^2) of 0.7574, which means the contribution of X_1 and X_2 to Y amounted to 75.74% while other factors influenced the rest. The relative contribution of X_1 was 41.3668% and X_2 by 58.6332% and the effective contribution of X_1 by 31.3312%

and X_2 by 44.4088%. The results of this calculation indicate that by increasing numerical ability and student motivation, mathematics student learning outcomes will be even better.

From the results of the fifth hypothesis test, it is found that there is a positive and significant relationship of numerical ability and the utilization of mathematics learning resources with student mathematics learning outcomes with a multiple correlation coefficient (R) of 0.7415, meaning that numerical ability and utilization of learning resources with mathematics learning outcomes have a high relationship. This can be explained through the linear relationship $\hat{Y} = 8{,}4605 + 0{,}6880\,X_1 + 0{,}1453\,X_3$. This means that every increase of one unit X_1 results in 0.6880 increase in Y and every increase in one unit X_3 results in 0.1453 increase in Y, in other words, if the numerical ability and utilization of students 'learning resources in mathematics are high, the students' mathematics learning outcomes will increase. This study also obtained a coefficient of determination (R^2) of 0.5498, which means that the contribution of X_1 and X_3 to Y was 54.98%, while other factors influenced the rest. The relative contribution of X_1 by 85.5439% and X_3 by 14.4561% and the effective contribution of X_1 by 47.0320% and X_3 by 7.9480%. The results of this calculation show that by increasing numerical ability and utilizing mathematics learning resources, student mathematics learning outcomes will be even better.

From the sixth hypothesis test results obtained that there is a positive and significant relationship of student learning motivation and the use of mathematics learning resources with student mathematics learning outcomes with a second correlation coefficient (R) of 0.8353, meaning that students learning motivation and utilization of learning resources with learning outcomes mathematics has a very high relationship. This can be explained through the linear relationship $\hat{Y} = 1{,}3328 + 0{,}6213\,X_2 + 0{,}2517\,X_3$. This means that each increase in one unit X_2 results in 0.6213 increase in Y and every increase in one unit X_3 results in 0.2517 increase in Y, in other words, if the motivation of student learning and the utilization of student learning resources in mathematics is high, then the results of students learning mathematics will increase. This study also obtained a coefficient of determination (R^2) of 0.6977, which means the contribution of X_1 and X_3 to Y amounted to 69.770%, while other factors influenced the rest. The relative contribution of X_2 by 80.2651% and X_3 by 19.7349% and the effective contribution of X_2 by 56.0010% and X_3 by 13.7690%. The results of this calculation indicate that by increasing student motivation and the use of learning resources in mathematics, student mathematics learning outcomes will be even better.

From the seventh hypothesis test results obtained that there is a positive and significant relationship of numerical ability, student learning motivation, and the utilization of mathematics learning resources with student mathematics learning outcomes with a second correlation coefficient (R) of 0.8796, meaning that numerical ability, learning motivation. The utilization of learning resources with mathematics learning outcomes has a very high relationship. This can be explained through the linear relationship $\hat{Y} = -6{,}7216 + 0{,}3826\,X_1 + 0{,}4888\,X_2 + 0{,}1309\,X_3$. This means that every increase of one unit X_1 results in 0.3826 increase in Y, every increase in one unit X_2 results in 0.4888 increase in Y, and every increase in one unit X_3 results in 0.1309 increase in Y, in other words, if numerical ability, student motivation, and the use of high mathematics learning resources, the student's mathematics learning outcomes will increase. This study also obtained a coefficient of determination (R^2) of 0.7737, which means 77.37% of learning outcomes are influenced by numerical ability, student motivation, and utilization of learning resources in mathematics.

In contrast, the rest is influenced by other factors not discussed in this study. In Indawati, Retno (2015), student mathematics learning outcomes are influenced by numerical abilities, verbal abilities, and parental attention by 67.375%. The rest is influenced by other factors not discussed in his research. In Rakhmawati, Fury (2015), student mathematics learning outcomes are influenced by self-concepts, study habits, and the use of learning resources by 42.38%. The rest is influenced by other factors not discussed in his research.

Furthermore, the magnitude of the relative contribution (RC) and the magnitude of the effective contribution (EC) for each of the numerical ability variables (X_1), Learning Motivation (X_2), and

utilization of learning resources (X_3) with mathematics learning outcomes (Y) can be concluded that the motivation variable Student learning contributes the most than the numerical ability variable and the learning resource utilization variable, as seen in Table 8.

Table 8. Summary of Relative Contributions and Effective Contributions

Variable	Relative Contributions (RC%)	Effective Contributions (EC%)
Numerical Ability (X_1)	33,8047 %	26,1547 %
Student's motivation to study (X_2)	56,9407 %	44,0550 %
Use of Learning Resources (X_3)	9,2546 %	7,1603 %
Total	100%	77,3700%

CONCLUSION

Based on the results of the research and discussion, several research conclusions can be drawn as follows:

1. There is a positive and significant relationship between numerical ability and mathematics learning outcomes for students of class VIII SMP Muhammadiyah 1 Yogyakarta Even Semester 2016/2017 Academic Year. This is indicated by the t-test, which is $t_{count} = 4.7373$ and t_{table} = 1.7171, so that $t_{count} > t_{table}$. The simple correlation coefficient (*r*) between numerical ability (X_1) with mathematics learning outcomes (Y) of 0.7106 with a regression equation $\hat{Y} = 12{,}8696 + 0{,}7749\ X_1$.
2. There is a positive and significant relationship between students' learning motivation and mathematics learning outcomes of class VIII SMP Muhammadiyah 1 Yogyakarta in Even Semester 2016/2017 Academic Year. This is indicated by the t-test, namely $t_{count} = 5{,}6826$ and $t_{table} = 1.7171$, so $t_{count} > t_{table}$. The simple correlation coefficient (*r*) between student motivation (X_2) with mathematics learning outcomes (Y) of 0.7712 with a regression equation $\hat{Y} = 14{,}1412 + 0{,}6922\ X_2$.
3. There is a positive and significant relationship between the use of mathematics learning resources with mathematics learning outcomes for students of class VIII SMP Muhammadiyah 1 Yogyakarta Even Semester 2016/2017 Academic Year. This is indicated by the t-test, which is $t_{count} = 2{,}5270$ and $t_{table} = 1.7171$, so $t_{count} > t_{table}$. The simple correlation coefficient (*r*) between the use of mathematics learning resources (X3) with mathematics learning outcomes (Y) of 0.4743 with a regression equation $\hat{Y} = 36{,}3906 + 0{,}4314\ X_3$.
4. There is a positive and significant relationship between numerical ability and student motivation to learn mathematics learning outcomes of students of class VIII SMP Muhammadiyah 1 Yogyakarta Even Semester 2016/2017 Academic Year. This is indicated by the F test, namely $F_{count} = 32.7811$ and $F_{table} = 3.47$, so $F_{count} > F_{table}$. The multiple correlation coefficient (R) between numerical ability (X_1) and student motivation (X_2) with mathematics learning outcomes (Y) is 0.8703 with a regression equation $\hat{Y} = -2{,}8683 + 0{,}4583X_1 + 0{,}4927\ X_2$.
5. There is a positive and significant relationship between numerical ability and the utilization of learning resources in mathematics with mathematics learning outcomes for students of class VIII SMP Muhammadiyah 1 Yogyakarta Even Semester 2016/2017 Academic Year. This is indicated by the F test, namely $F_{count} = 12.8230$ and $F_{table} = 3.47$, so $F_{count} > F_{table}$. The multiple correlation coefficient (*R*) between numerical ability (X_1) and the use of learning resources (X_3) with mathematics learning outcomes (Y) of 0.741503381 with the regression equation $\hat{Y} = 8{,}4605 + 0{,}6880\ X_1 + 0{,}1453\ X_3$.
6. There is a positive and significant relationship between student learning motivation and the use of learning resources in mathematics with mathematics learning outcomes for students of class VIII SMP Muhammadiyah 1 Yogyakarta Even Semester 2016/2017 Academic Year. This is indicated

by the F test, namely $F_{count} = 22{,}7928$ and $F_{table} = 3.47$, so $F_{count} > F_{table}$. The multiple correlation coefficient (R) between student learning motivation (X_2) and the use of learning resources (X_3) with mathematics learning outcomes (Y) of 0.8353 with a regression equation $\hat{Y} = 1{,}3328 + 0{,}6213\,X_2 + 0{,}2517\,X_3$.

7. There is a positive and significant relationship between numerical ability, student learning motivation, and the utilization of learning resources in mathematics with mathematics learning outcomes for students of class VIII SMP Muhammadiyah 1 Yogyakarta Even Semester 2016/2017 Academic Year. This is indicated by the F test, namely $F_{count} = 22.7928$ and $F_{table} = 3.10$, so $F_{count} > F_{table}$. The multiple correlation coefficient (R) between numerical ability (X_1), student learning motivation (X_2), and utilization of learning resources (X_3) with mathematics learning outcomes (Y) of 0.8796 with the regression equation $\hat{Y} = -6{,}721 + 0{,}382\,X_1 + 0{,}489\,X_2 + 0{,}131\,X_3$. The coefficient of determination is double (R^2) of 0.7737. This shows that student mathematics learning outcomes are influenced by numerical ability, student learning motivation, and the use of mathematics learning resources by 77.37%. In contrast, the rest is influenced by other factors not discussed in this study.

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