THE RELATION BETWEEN NUMERICAL ABILITY, LEARNING INDEPENDENCE, LEARNING ENVIRONMENT AT HOME AND MATHEMATICS LEARNING OUTCOMES

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ABSTRACT

Learning outcomes are presumably influenced by several factors, including numerical ability, learning independence, and learning environment at home. This study aims to determine whether there is a positive and significant relation between numerical ability, learning independence, learning environment at home. Mathematics learning outcomes of grade VIII students of Junior High School (SMP) Muhammadiyah 3 Yogyakarta, the Academic Year of 2017/2018. This study's population was grade VIII students of SMP Muhammadiyah 3 Yogyakarta in 2017/2018. A random sampling technique was applied to take this research sample, which is grade VIII C students. The data on numerical ability and mathematics learning outcomes were obtained through tests. Simultaneously, the data of the learning independence and learning environment at home were obtained through questionnaires. The research instruments were tested using a validity test, differential test, and reliability test. Analysis prerequisite tests include normality, linearity, and independence test. Simple regression and multiple linear regression analyses were used to analyze the data. The results show a positive and significant relation between numerical ability, learning independence, learning environment at home. Mathematics learning outcomes of grade VIII students of SMP Muhammadiyah 3 Yogyakarta in the Odd Semester of the Academic Year of 2017/2018. The F test results show $F_{statistic}$ (3.029) $> F_{critical\ value}$ (2.947). R = 0.495 and R^2 = 0,245 with $\hat{Y} = -10.458 + 0.005X_1 + 0.474 + 0.538X_3$, with RC X_1 = 0.806%, RC X_2 =49.232% and RC X_3= 49.962%. EC X_1 = 0.197%, EC X_2= 12.064% and EC X_3= 12.243%.

Keywords: Numerical Ability, Learning Independence, Learning Environment at Home, and Mathematics Learning Outcomes.

INTRODUCTION

Education plays an essential role in human life. According to Law Number 20 the Year 2003 article 3 concerning the National Education System which states that: "National education functions to develop capabilities and shape the nation's character and civilization with dignity in the context of educating the life of the nation, aiming at developing the potential of students to become people of faith and devotion to God Almighty, having noble, healthy, knowledgeable, capable, creative, be independent and be a democratic, responsible citizen.

Based on the function of national education, the quality of education of a country influences a country's progress. Therefore, the quality of a country can be seen from its quality human resources. Suppose a country has large human resources with good quality. In that case, it will become an asset for the country itself to develop further and advance the country. Various attempts were made by someone to get an education.

Education is carried out through various channels and levels, one of which is the formal path. While one level of formal education is the level of primary and secondary education carried out in schools. At school, students learn a variety of subjects, one of which is mathematics. According to Suherman, Erman (2003: 55-56), School mathematics is mathematics that is taught in schools, that is, mathematics taught in Primary Education (SD and SLTP) and Secondary Education (SLTA and SMK). Therefore, mathematics is called the queen of science. Mathematics is the key to other sciences. This is because, in every science, there are aspects of mathematics in it. Thus mathematics becomes an important subject and must be studied at every level of education. However, each student must have a

different view of mathematics. Some consider mathematics easy, and some consider math difficult. Students who consider mathematics an easy subject will surely grow motivated from within themselves to continue learning and solve math problems. However, on the contrary, if students find mathematics difficult, these students are undoubtedly motivated and challenged to solve mathematical problems. Attitudes like this can affect student learning outcomes.

Student mathematics learning outcomes can be seen from the daily tests of eighth-grade students of SMP Muhammadiyah 3 Yogyakarta can provide a concrete picture shown in Table 1.

Table 1. List of Daily Test Scores of Material for Algebraic Class VIII Odd Semester SMP Muhammadiyah 3 Yogyakarta Academic Year 2017/2018

	VIII A	VIII B	VIII C	VIII D	VIII E	VIII F
Total students	32	32	32	29	28	25
Score Maximum	80	87	83	95	80	65
Score Minimum	40	30	23	33	33	30
Average	55,1	55,1	57,4	47	50	60
Score < 75	29	28	28	28	27	25
Score ≥ 75	3	4	4	1	1	0
Percentage less than MCC	90,63%	87,50%	87,50%	96,55%	96,42%	100%

Source Data: SMP Muhammadiyah 3 Yogyakarta Tahun Ajaran 2017/2018

Table 1 shows that most of the daily test scores of mathematics subjects in class VIII of SMP Muhammadiyah 3 Yogyakarta are still low, less than the Minimum Completeness Criteria (MCC) the school, which is 75. To overcome this than necessary to find out the factors that affect student mathematics learning outcomes.

According to Slameto (2010: 54), Factors that influence learning of many types, but can be classified into two, namely internal and external factors. The many internal factors that affect student learning outcomes, numerical ability, and student learning independence are considered factors. The learning environment at home is also thought to be an external factor affecting mathematics learning outcomes.

Based on interviews with mathematics teachers and students of SMP Muhammadiyah 3 Yogyakarta on August 8, 2017. Obtained some information that students still have difficulty in counting, whether it is addition, subtraction, multiplication, and division. Students who are given assignments prefer to see their friends' work rather than asking the teacher. This also shows that the independence of student learning is still low. Students lack confidence in the results of their work. Some students also said that the less conducive house atmosphere made them rarely study because they did not concentrate.

The objectives to be achieved from the results of the research conducted is to determine whether or not there is:

1. A positive and significant relationship between numerical ability and mathematics learning outcomes of VIII grade students of SMP Muhammadiyah 3 Yogyakarta Odd Semester 2017/2018 Academic Year.

2. A positive and significant relationship between learning independence and Mathematics learning outcomes of VIII grade students of SMP Muhammadiyah 3 Yogyakarta Odd Semester 2017/2018 Academic Year.

3. A positive and significant relationship between the learning environment at home with Mathematics learning outcomes of VIII grade students of SMP Muhammadiyah 3 Yogyakarta Odd Semester for Academic Year 2017/2018.

4. A positive and significant relationship between numerical ability and learning independence with Mathematics learning outcomes of Grade VIII students of SMP Muhammadiyah 3 Yogyakarta Odd Semester Academic Year 2017/2018.

5. A positive and significant relationship between numerical ability and the learning environment at home with Mathematics learning outcomes of Grade VIII students of SMP Muhammadiyah 3 Yogyakarta Odd Semester Academic Year 2017/2018.
6. A positive and significant relationship between learning independence and learning environment at home with Mathematics learning outcomes of Grade VIII students of SMP Muhammadiyah 3 Yogyakarta Odd Semester Academic Year 2017/2018.
7. A positive and significant relationship between numerical ability, learning independence, and learning environment at home with Mathematics learning outcomes of students of class VIII of SMP Muhammadiyah 3 Yogyakarta Odd Semester Academic Year 2017/2018.

METHODS

This type of research is quantitative research. This study aims to determine whether there is a relationship between numerical ability, learning independence, and learning environment at home with mathematics learning outcomes for students of class VIII of SMP Muhammadiyah 3 Yogyakarta in the academic year 2017/2018. The relationship model between the independent variable and the dependent variable is arranged in the following research design:
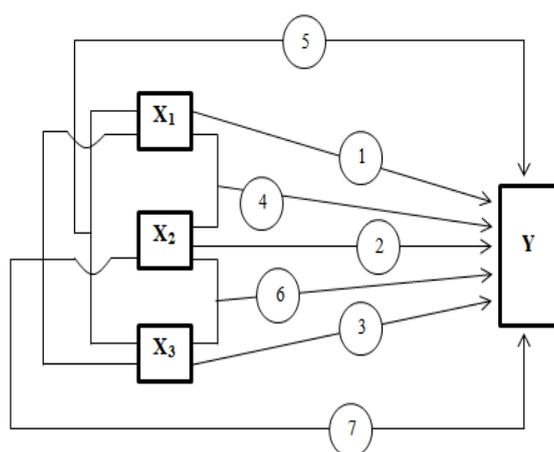

Figure 1. Research Design X_1, $X2, X_3$

Information:
X_1: Numerical Ability
X_2: Learning Independence
X_3: Learning Environment at Home
Y: Mathematics Learning Outcomes

(Sugiyono, 2015: 219)

This research was conducted at SMP Muhammadiyah 3 in Yogyakarta. The time used in this study was the Odd Semester for Academic Year 2017/2018. This research population is the eighth-grade students of SMP Muhammadiyah 3 Yogyakarta Odd Semester 2017/2018 Academic Year, which consists of 6 classes: class A, class B, class C, Class D, and Class E, class F. This study used a random sampling technique to class and obtained class VIII C as a research sample. Class VIII B as a trial class. This study consists of four variables, consisting of three independent variables (independent) and one dependent variable (dependent). The independent variables are numerical ability (X_1), learning independence (X_2), and learning environment at home (X_3), and the dependent variable is the result of learning mathematics as (Y). Data collection techniques in this study used a questionnaire (questionnaire) and tests. In this study, the questionnaire was used to obtain data on learning independence and the home's learning environment. At the same time, the test is used to obtain numerical ability data and mathematics learning outcomes.
Instrument Testing

Before being used to reveal the study's actual data, the learning outcomes were tested on the students of the experimental class, class VIII B. The instrument trials were conducted to determine the validity, different power, and reliability of the instruments.

Data analysis technique

1. Descriptive Data Analysis
2. Test Prerequisite Analysis
3. Three conditions must be met before testing a hypothesis: Normality test, Linearity Test, and Independent Test.
4. Hypothesis Test

RESULTS AND DISCUSSION

1. Description of Research Results
   a. The VIII C class's numerical abilitys at SMP Muhammadiyah 3 Yogyakarta in the Academic Year 2017/2018 is included in the medium category because the most significant frequency lies in the interval of $65.05 \leq X \leq 87.95$, namely 21 students or 65.625%.
   b. Independence learning class VIII C SMP Muhammadiyah 3 Yogyakarta Academic Year 2017/2018 is included in the medium category. The most significant frequency lies in the interval $70.23 \leq X \leq 88.77$, namely 20 students 62.5%.
   c. The learning environment in class VIII C of SMP Muhammadiyah 3 Yogyakarta Academic Year 2017/2018 is included in the medium category. The highest frequency is located at $71.219 \leq X \leq 85,.907$, namely 19 students or 59.375%.
   d. The results of learning mathematics in class VIII C SMP Muhammadiyah 3 Yogyakarta 2017/2018 Academic Year are included in the medium category because the most significant frequency lies in the interval $59.518 \leq X \leq 83.982$, namely 21 students 65,625%.
2. Normality Test Results

   Based on the normality test, it was found that the numerical ability variable, the learning independence variable, the learning environment variable at home, and the variable learning outcomes in mathematics are normally distributed. The normality test results for the four variables can be seen in Table 2.

Table 2. Normality Test Results

Variable	χ^2_{count}	χ^2_{table}	df	conclusion
Numerical Ability (X$_1$)	1,6596	7,8147	3	Normal
Learning Independence (X$_2$)	4,8779	7,8147	3	Normal
Home Learning Environment (X$_3$)	2,624	7,8147	3	Normal
Mathematics Learning Outcomes (Y)	3,8353	7,8147	3	Normal

3. Linearity Test Results

   The linearity test found that the numerical ability variable, the learning independence variable, and the learning environment variable at home with the linear mathematics learning outcome variable. The results of the linearity test can be seen in table 3.

Table 3. Linearity Test Results

Variable	F_{count}	F_{table}	Conclusion
X$_1$ with Y	0,3279	2,508	Linear
X$_2$ with Y	1,8118	2,471	Linear
X$_3$ with Y	0,8608	2,445	Linear

4. Independence Test Results

   Based on the independence test, it was found that the numerical ability variable with learning independence variable, numerical ability with the learning environment at home, and the learning

independence variable with the learning environment at home was independent. The independence test results can be seen in table 4.

Table 4. Independence Test Results

Variable	χ^2_{count}	χ^2_{table}	df	Conclusion
X_1 and X_2	29,7221	37,6525	25	Independent
X_1 and X_3	30,8009	37,6525	25	Independent
X_2 and X_3	36,0171	37,6255	25	Independent

5. Hypothesis Test Results
   a. Testing the first hypothesis

   In testing the significance of the correlation coefficient by using the t-test obtained $t_{count} = 2.5195$ while $t_{table} = 1.6973$ at a significant level of 5% and $v = n - 2 = 32 - 2 = 30$. The Rejection area used is $t_{count} > t_{table}$. Then obtained $2.5195 > 1.6973$, so that $H_{0,1}$ was rejected and $H_{1,1}$ was accepted, so there was a positive and significant relationship between the VIII grade students' numerical ability and mathematics learning outcomes of SMP Muhammadiyah 3 Yogyakarta Odd Semester Academic Year 2017/2018. Also, a simple regression equation of Y for X_1 is also obtained $\hat{Y} = 36,54136311 + 0,456973682X_1$.

   b. Testing the second hypothesis

   In testing the significance of the correlation coefficient by using t-test obtained $t_{count} = 2.3231$ while $t_{table} = 1.6973$ at a significant level of 5% and $v = n - 2 = 32 - 2 = 30$. The rejection area used is $t_{count} > t_{table}$. Then obtained $2.3231 > 1.6973$, $H_{0,2}$ was rejected, and $H_{1,2}$ was accepted, so there was a positive and significant relationship between learning independence and mathematics learning outcomes of VIII grade students of SMP Muhammadiyah 3 Yogyakarta Odd Semester Academic Year 2017/2018. A simple regression equation for Y over X_1 is also obtained $\hat{Y} = 23,9956515 + 0,59859864X_2$.

   c. Third hypothesis testing

   In testing the significance of the correlation coefficient by using the t-test obtained $t_{count} = 2.33374$ while $t_{table} = 1.6973$ at a significant level of 5% and $v = n - 2 = 32 - 2 = 30$. The rejection area used is $t_{count} > t_{table}$. Then obtained $2.3374 > 1.6973$, so that $H_{0,3}$ was rejected and $H_{1,3}$ was accepted, so there was a positive and significant relationship between learning environment at home with mathematics learning outcomes of VIII grade students of SMP Muhammadiyah 3 Yogyakarta Odd Semester Academic Year 2017 / 2018. A simple regression equation of Y for X_1 is also obtained $\hat{Y} = 16,18899128 + 0,677190164X_3$.

   d. Testing the fourth hypothesis

   In testing the significance of the correlation coefficient by using the F-test obtained $F_{count} = 4.3593$ while $F_{table} = 3.328$ at a significant level of 5% and $v_1 = 2$ and $v_2 = 29$ so that $F_{count} > F_{table}$ is obtained. Thus $H_{0,4}$ is rejected, and $H_{1,4}$ is accepted, so there is a positive and significant relationship between numerical ability and learning independence with mathematics learning outcomes of students of class VIII of SMP Muhammadiyah 3 Yogyakarta Odd Semester Academic Year 2017/2018. Besides, we also got the double linear regression equation for X_1 and X_2 is $\hat{Y} = 13,8387 + 0,3376X_1 + 0,4010X_2$.

   e. Testing the fifth hypothesis

   In testing the significance of the correlation coefficient using the F-test obtained $F_{count} = 4.8580$ while $F_{table} = 3.328$ at a significant level of 5% and $v_1 = 2$ and $v_2 = 29$ so that $F_{count} > F_{table}$ is obtained. Thus $H_{0,5}$ rejected, and $H_{1,5}$ accepted, so there is a positive and significant relationship between numerical ability and the learning environment at home with mathematics learning outcomes of students of class VIII of SMP Muhammadiyah 3 Yogyakarta Odd Semester Academic Year 2017/2018. We also obtained a double linear regression equation for X_1, and X_2 is $\hat{Y} = 3,1267 + 0,3581X_1 + 0,5015X_3$.

f. Testing the sixth hypothesis

In testing the significance of the correlation coefficient by using the F-test obtained $F_{count} = 4.6822$ while $F_{table} = 3.328$ at a significant level of 5% and $v_1 = 2$ and $v_2 = 29$ so that $F_{count} > F_{table}$ is obtained. Thus $H_{0,6}$ is rejected, and $H_{1,6}$ was accepted, so "there is a positive and significant relationship between learning independence and learning environment at home with mathematics learning outcomes of students of class VIII of SMP Muhammadiyah 3 Yogyakarta Odd Semester Academic Year 2017/2018". The double linear regression equation for X_2 and X_3 is also obtained as $\hat{Y} = -10,4011 + 0,4758X_2 + 0,5402X_3$.

g. Testing the seventh hypothesis

In testing the significance of the correlation coefficient using the F-test obtained $F_{count} = 3.0295$ while $F_{table} = 2.947$ at a significant level of 5% and $v_1 = 3$ and $v_2 = n - m - 1 = 32 - 3 - 1 = 28$ so that $F_{count} > F_{table}$ with thus $H_{0,7}$ is rejected and $H_{1,7}$ is accepted, so there is a positive and significant relationship between numerical ability, learning independence and learning environment at home with mathematics learning outcomes of VIII grade students of SMP Muhammadiyah 3 Yogyakarta Odd Semester Academic Year 2017/2018. In addition, we also obtained the double linear regression equation for X_1, X_2, and X_3 is $\hat{Y} = -10,4576 + 0,0052X_1 + 0,4737X_2 + 0,5382X_3$.

CONCLUSION

Based on the results of research and discussion, as described in Chapter IV, the following research conclusions can be drawn:

1. There is a positive and significant relationship between numerical ability and mathematics learning outcomes of VIII grade students of SMP Muhammadiyah 3 Yogyakarta Odd Semester Academic Year 2017/2018. This is indicated by the t-test that is $t_{count} > t_{table}$ or $2.5195 > 1.6973$. The simple correlation coefficient (r) between numerical ability and mathematics learning outcomes is 0.4179. And the simple regression equation Y for X_1 is $\hat{Y} = 36,54136311 + 0,456973682X_1$.

2. There is a positive and significant relationship between learning independence with mathematics learning outcomes for students of class VIII of SMP Muhammadiyah 3 Yogyakarta in Odd Semester for Academic Year 2017/2018. This is indicated by the t-test that is $t_{count} > t_{table}$ or $2.32314 > 1.6973$. The simple correlation coefficient (r) between learning independence and mathematics learning outcomes is 0.3905. And the simple regression equation Y for X_2 is $\hat{Y} = 23,9956515 + 0,59859864X_2$.

3. There is a positive and significant relationship between the learning environment at home with the mathematics learning outcomes of VIII grade students of SMP Muhammadiyah 3 Yogyakarta Odd Semester Academic Year 2017/2018. This is indicated by the t-test that is $t_{count} > t_{table}$ or $2.333 > 1.6973$. The simple correlation coefficient (r) between the learning environment at home with mathematics learning outcomes of 0.3925. Moreover, the simple regression equation Y for X_3 is $\hat{Y} = 16,18899128 + 0,677190164X_3$.

4. There is a positive and significant relationship between numerical ability and independence of learning with mathematics learning outcomes for students of class VIII of SMP Muhammadiyah 3 Yogyakarta Odd Semester for Academic Year 2017/2018. This is indicated by the F test that is $F_{count} > F_{table}$ or $4.3593 > 3.328$. The multiple correlation coefficient (R) between numerical ability and learning independence with mathematics learning outcomes is 0.4808. The coefficient of determination (R^2) is 0.2311 with a linear line equation $\hat{Y} = 13,8387 + 0,3376X_1 + 0,4010$. The relative contribution of X_1 was 55.808%, and X_2 was 44.192%, and the effective contribution of X_1 was 12.900%, and X_2 was 10.215%.

5. There is a positive and significant relationship between numerical ability and the learning environment at home with the mathematics learning outcomes of Grade VIII students of SMP Muhammadiyah 3 Yogyakarta Odd Semester Academic Year 2017/2018. This is indicated by the F

test, which is $F_{count} > F_{table}$ or $4.8580 > 3.328$. The multiple correlation coefficient (R) between numerical ability and the learning environment at home with mathematics learning outcomes is 0.5010. The coefficient of determination (R^2) is 0.2510 with a linear line equation $\hat{Y} = 3,1267 + 0,3581X_1 + 0,5015X_3$. The relative contribution of X_1 was 54.540%, and X_3 was 45.460%, and the effective contribution of X_1 was 13.687%, and X_3 was 11.408%.

6. There is a positive and significant relationship between learning independence and the learning environment at home with the mathematics learning outcomes of Grade VIII students of SMP Muhammadiyah 3 Yogyakarta Odd Semester Academic Year 2017/2018. This is indicated by the F test, which is $F_{count} > F_{table}$ or $4.6822 > 3.328$. The multiple correlation coefficient (R) between learning independence and the learning environment at home with mathematics learning outcomes of 0.4941 and the coefficient of determination (R^2) of 0.2441 with a linear line equation $\hat{Y} = -10,4011 + 0,4758X_2 + 0,5402X_3$. The relative contribution of X_2 was 49,652%, and X_3 was 50,348%, and the effective contribution of X_2 was 12,119%, and X_3 was 12,289%.

7. There is a positive and significant relationship between numerical ability, learning independence, and learning environment at home with mathematics learning outcomes of students of class VIII of SMP Muhammadiyah 3 Yogyakarta Odd Semester Academic Year 2017/2018. This is indicated by the F test, which is $F_{count} > F_{table}$ or $3.0295 > 2.947$. The correlation coefficient (R) between numerical ability, learning independence, and learning environment at home with mathematics learning outcomes of 0.4950 and the coefficient of determination (R^2) of 0.2450 with a linear line equation $\hat{Y} = -10,4576 + 0,0052X_1 + 0,4737X_2 + 0,5382X_3$. The relative contribution of X_1 is 0.806%, X_2 is 49.232% and X_3 is 49.962%, and the effective contribution is X_1 is 0.197%, X_2 is 12.064% and X_3 is 12.224%.

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