# RELATIONSHIP BETWEEN NUMERICAL CAPABILITIES, INDEPENDENCE OF LEARNING AND PEERS WITH MATHEMATICS LEARNING OUTCOMES OF STUDENTS IN CLASS VIII

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**ABSTRACT**

Low numeric ability and student independence learning, as well as among peers interaction are estimated with low mathematics obtained by students. The objective of this research is to know whether or not there is a correlation between numeric ability, independent learning, and peers with the result of mathematic at the 8th-grade students of Muhammadiyah Junior High School 3 Yogyakarta (SMP Muhammadiyah 3 Yogyakarta) in academic year 2016/2017. The population of this research is the 8th grades students of SMP Muhammadiyah 3 Yogyakarta. The sample of this research is taken using a random sampling technique to class, and obtained class VIII G as a sample class and VIII C as an experimental class. The data is taken from documentation, questionnaires, and test. The instrument uses validity and reliability. The data analysis uses prerequisite treatment include normality and independent treatment with the form of Chi-Square, linearity test using F-test formula, and hypothesis test using t-test. The result of the research showed that there is a positive and significant correlation between (1) numeric ability with the result of mathematics, with r = 0,6682 and $\hat{Y} = 67{,}0551 + 0{,}1180\,X_1$ ; (2) independent learning with the result of mathematics, with r = 0,4113 and $\hat{Y} = 69{,}6982 + 0{,}0820\,X_2$ ; (3) peers with the result of mathematics, with r = 0,3862 and $\hat{Y} = 69{,}2026 + 0{,}0892\,X_3$; (4) numeric ability and independent learning with the result of mathematics, with r = 0,4815 and $\hat{Y} = 64{,}7033 + 0{,}1055\,X_1 + 0{,}0399\,X_2$ and RC $X_1$ = 82,9% , RC $X_2$ = 17,1% and EC $X_1$ = 39,9% , EC $X_2$ = 8,2% ; (5) numeric ability and peers with the result of mathematics, with, r = 0,4520 and $\hat{Y} = 66{,}0364 + 0{,}1110\,X_1 + 0{,}0192\,X_2$ and RC $X_1$ = 92,9% , RC $X_3$ = 7,1% and EC $X_1$ = 41,7% , EC $X_3$ = 3,2% ; (6) independent learning and peers with the result of mathematics, with r = 0,2304 and $\hat{Y} = 66{,}3919 + 0{,}0610X_2 + 0{,}0611\,X_2$ and RC $X_2$ = 55,2% , RC $X_3$ = 44,8% and EC $X_2$ = 12,7% , EC $X_3$ = 10,3% ; (7) numeric ability, independent learning, and peers with the result of mathematics, with r = 0,4821 and $\hat{Y} = 64{,}4629 + 0{,}1038\,X_1 + 0{,}0386\,X_2 + 0{,}0059\,X_3$ and RC $X_1$ = 81,4%, RC $X_2$ = 16,5% ,RC $X_3$ = 2,1% and EC $X_1$ = 39,2% EC $X_2$ = 7,9% EC $X_3$ = 1,0 %.

**Keywords**: Numeric Ability, Independence Learning, and Peers, Mathematics Learning Outcomes.

## INTRODUCTION

The state has a national goal, which is to educate the nation's life. In this case, the state organizes education as an effort to educate Indonesian citizens. State activities in the field of education as the implementation of the Preamble to the 1945 Basic Law paragraph IV, which states that the state is obliged to educate the life of the nation. Based on RI Law No. 20 of 2003 Chapter 1 Article 1 (1) concerning the National Education System states: Education is a conscious and planned effort to create an atmosphere of learning and learning process so that students actively develop their potential to have spiritual, religious, self-control, personality, intelligence, noble character, and the skills needed by himself, the community, nation, and state.

In its implementation, education in Indonesia is carried out through one of the formal education channels. Formal education is a structured and tiered education pathway consisting of primary education, secondary education, and higher education—one level of formal education in Junior High School. SMP Muhammadiyah 3 Yogyakarta is one of the Muhammadiyah junior high schools in Yogyakarta is located on Jl. Captain Piere Tendean No. 19 Yogyakarta. The school has a vision The

realization of students who have faith, discipline, skilled, excel in achievement, and environmentally friendly.

As a fundamental science, mathematics has an important role in supporting the realization of the school's vision above. However, mathematics is different from social lessons which can be learned only by memorization. To understand the higher concept, you must first understand the lower concept. So many students do not like math compared to other subjects. Students assume that mathematics is difficult to understand because there are many complicated and confusing formulas.

According to Slameto (2003: 54-72), an outline can be classified into two factors that affect learning success, namely:

1. Internal factors are factors that originate in students include (a)—physical factors such as health and disability, and (b). Psychological factors include intelligence (ability to think), attention, interests, talents, ways of student learning, independence, self-concept, and student anxiety in learning.
2. External factors are factors originating from outside students themselves include (a). Family factors such as the way parents educate the home's atmosphere and understanding of parents (b)—school factors such as teaching methods, school discipline, and school time.

One factor that comes from within students who play a role in the learning process is numerical ability. Numerical ability is the ability to calculate operations, including addition, subtraction, multiplication, division, removal, and root withdrawal operations (Hartati, Diana RC I and Widayati: 2015). Another internal factor is learning independence. Learning independence is a condition where students learn on their initiative or without help from other parties able to solve the problems they face. In this case, students do not mean completely separated from other parties. Students can ask for help from others who are deemed able to help, but that does not mean they have to depend on them. A student who has the desire to learn independently means that he has realized the importance of improving learning outcomes.

In addition to factors from within (internal), external factors (external) that affect student learning outcomes are peer relationships. Peers are included in external factors that are thought to be related to student learning outcomes. Intercourse with peers can occur in the school environment or at home. Peers are thought to have more influence on student learning outcomes than older or younger peers because, with peers, students will find it easier to communicate subjects, especially mathematics, which requires collaboration in solving a problem. Based on information from mathematics teachers in class VIII in SMP Muhammadiyah 3 Yogyakarta on November 11, 2016, that student mathematics learning outcomes are still very low. Of the four classes taught by Mr. Agus Wiratno, S.Si, only six students passed the Minimum Completeness Criteria (MCC), wherein it is known that the MCC for mathematics class VIII at SMP Muhammadiyah 3 Yogyakarta is 75.

Based on the results of interviews with mathematics teachers of class VIII at SMP Muhammadiyah 3 Yogyakarta on November 11, 2016, the teacher said that students' numerical ability was still very low, especially in the operation of negative integers. They do not understand it even though the teacher has used a different method. Other information is that the teacher says that student independence is still low. This can be seen when following the process of learning mathematics, students are passive and do not dare to ask if they have difficulty understanding the material being taught. Also, if given homework by the teacher, most of them do not do.

Based on information obtained from many SMP Muhammadiyah 3 Yogyakarta students on November 11, 2016, they said that in terms of relationships both in the school environment and at home, they were only hanging out with peers who felt comfortable interacting with each other. Hence, students tended to have their social groups-alone. Also, in the association, students do not pay much attention to peers so that peers easily influence students from both positive and negative sides.

## METHODS

This research was conducted at SMP Muhammadiyah 3 Yogyakarta in the even semester of the 2016/2017 school year. The population is defined as a generalization area consisting of objects/subjects that have certain qualities and characteristics determined by researchers to be studied and then drawn conclusions (Sugiyono:2012). The population in this study were students of class VIII SMP Muhammadiyah 3 Yogyakarta consisting of 7 classes, namely class VIII A, VIII B, VIII C, VIII D, VIII E, VIII F, and VIII G. Class VIII A, VIII B, VIII C, VIII D are superior classes and classes VIII E, VIII F, VIII G are regular classes. The sample is a portion of the population (Sugiyono: 2012). In this study, the sample was taken one class at random using random sampling techniques to the class. Said to be random because the sampling class is done randomly from the existing class. The class taken as a sample class is class VIII G, with 26 students.

Variables are constructs or traits that are being studied (Sarwono, Jonathan: 2006). The variables used in this study are the independent variables and the dependent variable. The independent variable consists of Numerical Ability ($X_1$), Learning Independence ($X_2$), and Peer ($X_3$). The dependent variable is Mathematics Learning Outcomes (Y). The data collection methods used were questionnaires, tests, and documentation methods. The questionnaire method is used to obtain data on learning independence and peers. The test method is used to obtain data on a student's numerical ability levels. The documentation method is used to obtain Midterm VIII grade at SMP Muhammadiyah 3 Yogyakarta in the even semester of the academic year 2016/2017.

## RESULTS AND DISCUSSION

1. The first hypothesis test result is that there is a positive and significant relationship between numerical ability and mathematics learning outcomes, with a simple correlation coefficient (r) 0.6682 at a significant level of 5%. This can be explained through the linear relationship $\hat{Y} = 67{,}0551 + 0{,}1180\,X_1$. This means that every increase of one unit $X_1$ results in a 0.1180 increase in Y; in other words, if the numerical ability is high, the mathematics learning outcomes will increase. From the results of this calculation, it can be seen that by increasing numerical ability, student mathematics learning outcomes will be better, and vice versa
2. The second hypothesis test result is that there is a positive and significant relationship of learning independence with mathematics learning outcomes, with a simple correlation coefficient (r) 0.4113 at a significant level of 5%. This can be explained through the linear relationship $\hat{Y} = 69{,}6982 + 0{,}0820\,X_2$. This means that every increase of one unit of $X_2$ results in a 0.0820 increase in Y; in other words, if the independence of learning is high, the mathematical learning outcomes will increase. From the results of these calculations, it can be seen that by increasing student learning independence, student mathematics learning outcomes will be even better, and vice versa.
3. The third hypothesis test results show a positive and significant relationship of peers with mathematics learning outcomes, with a simple correlation coefficient (*r*) of 0.3862 at a significant level of 5%. This can be explained through the linear relationship $\hat{Y} = 69{,}2026 + 0{,}0892\,X_3$. This means that every increase of one unit $X_3$ results in 0.0892 increase in Y. In other words, the existence of a good peer, it can affect the learning outcomes of mathematics to be increased.
4. The fourth hypothesis test result is that there is a positive and significant relationship of numerical ability and learning independence with mathematics learning outcomes, with a multiple correlation coefficient (*R*) of 0.4815 at a significant level of 5%. This can be explained through the linear relationship $\hat{Y} = 64{,}7033 + 0{,}1055\,X_1 + 0{,}0399\,X_2$. This means that every increase in one unit $X_1$ results in a 0.1055 increase in Y, and every increase in one unit $X_2$ results in a 0.0399 increase in Y, in other words, if numerical ability and independence of learning are high, the learning outcomes of mathematics will increase. While the relative contribution of $X_1$ is 82.9%, and $X_2$ is 17.1%. Effective contribution $X_1$ is 39.9%, and $X_2$ is 8.2%. From the results of

this calculation, it can be seen that by increasing numerical ability and independence of learning in mathematics, the results of student mathematics learning will be even better, and vice versa.

5. The fifth hypothesis test results are that there is a positive and significant relationship of numerical ability and peers with mathematics learning outcomes, with a multiple correlation coefficient (*R*) of 0.4520 at a significant level of 5%. This can be explained through the linear relationship $\hat{Y} = 66{,}0364 + 0{,}1110\,X_1 + 0{,}0192\,X_3$. This means that each increase of one unit $X_1$ results in a 0.1110 increase in Y, and every increase in one unit $X_3$ results in a 0.0192 increase in Y, in other words, if numerical ability and peer relations are good, the mathematics learning outcomes will increase. While the relative contribution of $X_1$ is 92.9%, and $X_3$ is 7.1%. Effective contribution $X_1$ is 41.7%, and $X_3$ is 3.2%. From the results of this calculation, it can be seen that by increasing numerical ability and peer relationships, student mathematics learning outcomes will be even better, and vice versa.
6. The sixth hypothesis test results are that there is a positive and significant relationship of learning independence and peers with mathematics learning outcomes, with a second correlation coefficient (R) of 0.2304 at a significant level of 5%. This can be explained through the linear relationship $\hat{Y} = 66{,}3919 + 0{,}0610\,X_2 + 0{,}0611\,X_3$. This means that every increase of one unit $X_2$ results in a 0.0610 increase in Y, and every increase in one unit $X_3$ results in a 0.0611 increase in Y, in other words, if the independence of learning and good peer relations, then the results of learning mathematics will also increase. While the relative contribution of $X_2$ is 55.2%, and $X_3$ is 44.8%. The effective contribution of $X_2$ is 12.7%, and $X_3$ is 10.3%. From the results of this calculation, it can be seen that by increasing the independence of learning and peer relationships in mathematics subjects, student mathematics learning outcomes will be even better, and vice versa.
7. The seventh hypothesis test results are that there is a positive and significant relationship of numerical ability, learning independence, and peers with mathematics learning outcomes, with a multiple correlation coefficient (*R*) of 0.4821 at a significant level of 5%. This can be explained through the linear relationship $\hat{Y} = 64{,}4629 + 0{,}1038\,X_1 + 0{,}0386\,X_2 + 0{,}0059\,X_3$. This means that each increase of one unit $X_1$ results in 0.1038 increase in Y, every increase in one unit $X_2$ results in 0.0386 increase in Y and every increase in one unit $X_3$ results in 0.0059 increase in Y, in other words, if the numerical ability and independence of student learning are great as well good peer relationships, the learning outcomes of mathematics will increase, and vice versa. While the relative contribution of $X_1$ is 81.4%, $X_2$ is 16.5%, and $X_3$ is 2.1%. Effective contribution $X_1$ is 39.2%, $X_2$ is 7.9% and $X_3$ is 1.0%.

## CONCLUSION

From 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 of VIII grade students of SMP Muhammadiyah 3 Yogyakarta, even semester 2016/2017 academic year. This is indicated by the t-test that is $t_{count} = 4{,}399$; $t_{table} = 1{,}7109$, so $t_{count} > t_{table}$. The simple correlation coefficient (*r*) between numerical ability ($X_1$) with mathematics learning outcomes is 0.6682. And the regression equation Y for $X_1$ is $\hat{Y} = 67{,}0551 + 0{,}1180\,X_1$.
2. There is a positive and significant relationship between learning independence and mathematics learning outcomes of VIII grade students of SMP Muhammadiyah 3 Yogyakarta, even semester 2016/2017 academic year. This is indicated by the t-test that is $t_{count} = 2{,}2106, t_{table} = 1{,}7109$, so $t_{count} > t_{table}$. The simple correlation coefficient (*r*) between learning independence ($X_2$) with mathematics learning outcomes (Y) of 0.4113. Moreover, the simple regression equation for Y over $X_2$ is $\hat{Y} = 69{,}6982 + 0{,}0820\,X_2$.
3. There is a positive and significant relationship between peers and mathematics learning outcomes of VIII grade students of SMP Muhammadiyah 3 Yogyakarta, even semester 2016/2017 academic

year. This is indicated by the t-test that is $t_{count} = 2.0511, t_{table} = 1.7109$, so $t_{count} > t_{table}$. The simple correlation coefficient ($r$) between peers ($X_3$) with mathematics learning outcomes of 0.3862. And the simple regression equation Y for $X_3$ is $\hat{Y} = 69{,}2026 + 0{,}0892\, X_3$.

4. There is a positive and significant relationship between numerical ability and independence of learning with mathematics learning outcomes of students of class VIII of SMP Muhammadiyah 3 Yogyakarta in the even semester of the 2016/2017 school year. This is indicated by the F-test that is $F_{count} = 10.6794, F_{table} = 3.42$, so $F_{count} > F_{table}$. The value of the multiple correlation coefficient ($R$) between numerical ability ($X_1$) and learning independence ($X_2$) with mathematics learning outcomes is 0.4815. Also, the double linear regression equation for $X_1$ and $X_2$ is obtained $\hat{Y} = 64{,}7033 + 0{,}1055\, X_1 + 0{,}0399\, X_2$. The relative contribution of $X_1$ is 82.9%, and $X_2$ is 17.1%. Effective contribution $X_1$ is 39.9% and $X_2$is 8.2%.
5. There is a positive and significant relationship between numerical ability and peers with mathematics learning outcomes of VIII grade students of SMP Muhammadiyah 3 Yogyakarta, even semester 2016/2017 academic year. This is indicated by the F-test that is $F_{count} = 9.4854, F_{table} = 3.42$, so $F_{count} > F_{table}$. The value of the multiple correlation coefficient ($R$) between numerical ability ($X_1$) and peers ($X_3$) with mathematics learning outcomes of 0.4520. And the double linear regression equation for $X_1$and $X_3$ is $\hat{Y} = 66{,}0364 + 0{,}1110\, X_1 + 0{,}0192\, X_2$. The relative contribution of $X_1$ is 92.9%, and $X_3$ is 7.1%. Effective contribution $X_1$ is 41.7%, and $X_3$ is 3.2%.
6. There is a positive and significant relationship between independence and peers with mathematics learning outcomes of eighth-grade students of SMP Muhammadiyah 3 Yogyakarta, even semester 2016/2017 academic year. This is indicated by the F-test that is $F_{count} = 3.4428, F_{table} = 3.42$, so $F_{count} > F_{table}$. The value of the multiple correlation coefficient ($R$) between learning independence ($X_2$ ) and peers ($X_3$ ) with mathematics learning outcomes of 0.2304. Also, the double linear regression equation for $X_2$ and $X_3$ is obtained $\hat{Y} = 66{,}3919 + 0{,}0610\, X_2 + 0{,}0611\, X_2$. The relative contribution of $X_2$ is 55.2%, and X3 is 44.8%. The effective contribution of $X_2$ is 12.7%, and $X_3$ is 10.3%.
7. There is a positive and significant relationship between numerical ability, learning independence, and peers with mathematics learning outcomes of VIII grade students of SMP Muhammadiyah 3 Yogyakarta, even semester 2016/2017 academic year. This is indicated by the F-test that is $F_{hitung} = 6.8256, F_{tabel} = 3.05, F_{count} > F_{table}$. The value of the multiple correlation coefficient ($R$) between numerical ability ($X_1$), learning independence ($X_2$), and peers ($X_3$) with mathematics learning outcomes of 0.4821. Also, the double linear regression equation for $X_1$, $X_2$, and $X_3$ is obtained $\hat{Y} = 64{,}4629 + 0{,}1038\, X_1 + 0{,}0386\, X_2 + 0{,}0059\, X_3$. The relative contribution of $X_1$ is 81.4%, $X_2$ is 16.5% and $X_3$ is 2.1%. Effective contribution $X_1$is 39.2%, $X_2$ is 7.9% and $X_3$ is 1.0%.

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