

THE INFLUENCE OF NUMERIC ABILITY AND LEARNING MOTIVATION TOWARD STUDENTS' MATHEMATICS LEARNING ACHIEVEMENT AT VII GRADE OF SMP MUHAMMADIYAH 1 MINGGIR SLEMAN

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ABSTRACT

The result of students' mathematics learning achievement is influenced by many factors. Numerical ability and learning motivation are some factors expected to affect students' achievement in learning mathematics. Therefore, this research was conducted in order to determine the effect of numerical ability and learning motivation toward students' achievement in learning mathematics at SMP Muhammadiyah 1 Minggir, Sleman in the academic year 2016 / 2017. The research population was the seven grade students of SMP Muhammadiyah 1 Minggir, Sleman in the academic year 2016 / 2017, with the total of students are 212 students. The sample of this research is VII D and VII E as the experimental class and VII-A as an experimental class that determined non-random. The data collection technique using test and non-test technique. Instrument items tested by using validity test, discriminating power test and reliability test, while the questionnaire was tested by using reliability test and examined by experts. The data analysis used a hypothesis test. The result of the statistical hypothesis test found that on significance level 5% and the degree of freedom 56 shown that : (1) There is an influence of numerical ability towards mathematics learning achievement. It is shown in $F_{count} = 27.049102$ and $F_{table} = 4.01$ so $F_{count} > F_{table}$, (2) There is an influence of learning motivation towards mathematics learning achievement. This is indicated by the value of $F_{count} = 6.1934977$ and $F_{table} = 4.01$, so the value of $F_{count} > F_{table}$, (3) There is an influence of numerical ability and learning motivation towards mathematics learning achievement. This is shown by the value of $F_{stat} = 4.0281682$ and $F_{table} = 4.01$, so the value of $F_{count} > F_{table}$. The result of the statistical hypothesis test found that on significance level 5% and the degree of freedom 56 shown that : (1) mathematics learning achievement of a student who has a high numerical ability is better than student who has low numerical ability. It is proved by the value of $t_{stat} = -1.3667$ and $t_{table} = 1.67203$ so $t_{count} < t_{table}$, (2) mathematics Learning achievement of a student who has a high learning motivation is better than a student who has low motivation. It the in $t_{count} = -0.4779$ and $t_{table} = 1.67203$, thus $t_{count} < t_{table}$.

Keywords: numeric ability, learning motivation, mathematics learning achievement.

INTRODUCTION

Education is a conscious effort from humans to their younger generation (it could be the same age or more) so that the generation will become humans who have a whole personality in responding to the challenges of the times. In Indonesia education is given from elementary schools to tertiary institutions. Education must be focused on quality education, both in terms of input, process, and results, with the holding of quality education, which will help in increasing quality human resources, so that the mouth can optimize the realization of sustainable development in all areas of life. The education process is the process of developing students' potentials to become certain abilities and skills. Every student must be treated fairly in the education process, including the assessment process. For this reason, the evaluation process must have a sense of justice, equality and high objectivity. The statement implies that each student must be treated equally and minimize all forms of procedures or actions that benefit or harm one or a group of students. In addition, a fair assessment must not distinguish between socioeconomic, cultural, linguistic and gender backgrounds.

The purpose of education is to help students develop their potential to the fullest. Students see the school as a place to find a source of provisions that will make the world. One of the subjects in schools that can achieve these goals in mathematics. In Suherman, Erman et al (2013: 16) mathematics is the

science of structures that are deductive or axiomatic, accurate, abstract, rigorous and so on. generally considered the most difficult and very boring for middle school students. Though mathematics is simple and easy if students know the basic concepts. As one of the fields of study taught at every level of education, mathematics also has a very dominant role in educating students by developing the ability to think logically, critically, analytically and systematically. Therefore, a teacher needs to recognize students with the aim of knowing the extent of their students' abilities in dealing with learning situations. The abilities that affect mathematical abilities include general abilities (intelligence), inductive and deductive reasoning, spatial abilities, numerical abilities and verbal abilities.

According to Dandy in Indrawati, Farah (2013) numerical ability is the ability in terms of counting numbers to find out how well someone can understand ideas and concepts that are expressed in numbers and how easily someone can think and solve problems with numbers. According to Agustin Leoni in Rosida, Halima, Widha Sunarno and Supurwoko (2002: 14) numerical ability is the ability related to numbers and the ability to count. Meanwhile, according to Astuti et al in Iriawan, Ari (2016: 123) numerical ability is the ability relating to accuracy and speed in the use of basic arithmetic functions. From the above understanding, it can be concluded that numerical ability is an ability related to accuracy and speed using basic arithmetic functions. In this study, only numerical abilities in terms of basic arithmetic operations were examined.

In addition to knowing the extent of students' abilities, a teacher also needs to know and motivate students to increase their interest in learning. Sartain in Purwanto, Ngalim (2007: 61) said that: Motivation is a complex statement in an organism that directs behavior towards a goal or an incentive. Objectives are those that limit / determine the organism's behavior. While Gredler, Broussard, and Garrison in Karwati, Euis (2014: 166) motivation is an attribute that moves a person to do or not do something. Uno, Hamzah B (2007: 3) revealed motivation comes from the word motive that can be interpreted as the strength contained in the individual, which causes the individual to act or act. Motives can not be observed directly but can be interpreted in their behavior, in the form of stimuli, encouragement, or power generation of a particular behavior. While according to AM, Sardiman (2012: 75) motivation can be said to be a series of efforts to provide conditions certainly, so that someone wants and wants to do something, and if he does not like it, it will try to negate or avoid the feeling of dislike. Adaptation according to Slameto (20120: 2) learning is a business process carried out by someone to obtain a change in behavior. new behavior as a whole, as a result of his own experience in interaction with the environment. From these notions, it can be concluded that motivation to learn can be defined as an effort that causes individuals to act or do what they get from interactions with the environment shown in various forms such as changes in knowledge, s his skills, skills and abilities. Indicators of learning motivation that are used for this study, namely: 1. Diligent in dealing with tasks, 2. Resilient to face difficulties / Not easily discouraged, 3. Show interest, 4. Happy to work independently, 5. Fast bored on routine tasks, 6. Can defend his opinion, 7. It is not easy to let go of things that are believed / confident, 8. Happy to find and solve problems.

Based on the results of interviews with class VII teachers in SMP Muhammadiyah 1 Minggir Sleman Regency which has seven classes for class VII with 212 students on January 6, 2017, the teacher said that of the many students there were still many who had difficulties in numerical ability, for example still there are many errors when solving basic arithmetic operations such as addition, subtraction, multiplication and division so that many of them have unsatisfactory learning outcomes. According to Gagne & Briggs in Suprihatiningrum, Jamil (2013: 37) learning outcomes are abilities possessed by students as a result of acts of learning and can be observed through student performance (learner's performance). Meanwhile, according to his Supratik in Widodo, Lusi Widayanti (2012: 34) learning outcomes which become the object of class assessment are new abilities obtained by students after they follow the teaching and learning process about certain subjects. According to several experts quoted by Suherman, Erman et al (2013: 16-17) James and James in their mathematical dictionary state that mathematics is the science of logic, concerning forms, structures, quantities, and concepts that are interconnected with one another with a large number divided into three fields, namely algebra, analysis,

and geometry ., 2. Reys argues that mathematics is a study of patterns and relationships, a path or thinker, an art, a discussion, and a tool., 3. The client states that mathematics is not a solitary knowledge that can be perfect because of himself, but the existence of mathematics is mainly to assist humans in understanding and mastering social, economic, and natural problems. From the understanding of learning outcomes and mathematics above it can be concluded that mathematics learning outcomes are changes in behavior, patterns of actions, values, attitudes, appreciation and skills that help humans in understanding and mastering social, economic, and natural problems that obtained by students after he received the experience of learning mathematics.

In addition, based on information from mathematics subject teachers there are still many students who lack the motivation to learn, for example, are not diligent in facing assignments, are less tenacious in facing difficulties, and prefer to work in groups, causing low mathematics learning outcomes.

Other information obtained from the results of the mathematics teacher interview class VII mathematics subjects at SMP Muhammadiyah 1 Minggir, Sleman Regency said that the results of learning mathematics students are still low. It is evident from a large number of students who have not yet completed or have not yet reached the minimum completeness criteria (MCC) 65. A summary of the average midterm scores (UTS) in mathematics can be seen in table 1.

Table 1. Average Summary of Middle Semester (UTS) Tests for Mathematics Lessons for Grade VII Students of SMP Muhammadiyah 1 Minggir, Sleman Regency, Semsal, Academic Year 2016/2017

| | | Total students | Complete | Not complete | Average | Highest score | Lowest value |
|-------------------|-------|----------------|----------|--------------|---------|---------------|--------------|
| Class | VII A | 32 | 0 | 32 | 38,36 | 60,00 | 27,50 |
| | VII B | 34 | 0 | 34 | 37,30 | 52,50 | 20,00 |
| | VII C | 29 | 0 | 29 | 31,55 | 47,50 | 20,00 |
| | VII D | 29 | 0 | 29 | 42,15 | 62,50 | 22,50 |
| | VII E | 30 | 0 | 30 | 33,58 | 47,50 | 15,00 |
| | VII F | 28 | 0 | 28 | 34,64 | 45,00 | 22,50 |
| | VII G | 26 | 0 | 26 | 26,25 | 55,00 | 17,50 |
| Total | | 212 | 0 | 212 | - | - | - |
| Percentage | | 100% | 0 | 100% | - | - | - |

Data Source: SMP Muhammadiyah 1 minggir Kabupaten sleman

Based on the background of the problem, then the problem can be formulated to be examined as follows:

1. Is there an effect of numerical ability on mathematics learning outcomes of Grade VII students of Muhamamdiyah 1 Minggir Middle School Sleman Regency Semester Even Academic Year 2106/2017?
1. Is there an influence of learning motivation on mathematics learning outcomes of VII grade students of Muhamamdiyah 1 Minggir Middle School Sleman Regency Semester Even Academic Year 2106/2017?
2. Is there an effect of numerical ability and learning motivation on mathematics learning outcomes of Grade VII students of Muhamamdiyah 1 Minggir Middle School Sleman Regency Semester Even Academic Year 2106/2017?

In connection with the problem formulation that has been described, the objectives of this research are:

1. To find out whether or not there is an effect of numerical ability on mathematics learning outcomes of Grade VII students of SMP Muhamamdiyah 1 Minggir, Sleman Regency Semester Even Academic Year 2106/2017.
2. To find out whether or not there was an influence of learning motivation on mathematics learning outcomes of Grade VII students of Muhamamdiyah 1 Minggir Middle School Sleman Regency Semester Even Academic Year 2106/2017.

3. To find out whether or not there is an influence of numerical ability and learning motivation on mathematics learning outcomes of Grade VII students of SMP Muhammadiyah 1 Minggir, Sleman Regency Semester Even Academic Year 2106/2017.

METHODS

This research is classified as quantitative research. The research design used can be seen in table 2.

Table 2. Research Design

| | | Motivation to learn (X_2) | |
|-----------------------------|------|-------------------------------|------|
| | | Low | High |
| Numerical ability (X_1) | Low | Y | Y |
| | High | Y | Y |

The research was conducted at Muhammadiyah 1 Minggir Middle School on January 17, January 18, January 19, January 20, January 26 and January 28. According to Sugiyono (2009: 117) population is a generalization area consisting of objects/subjects that have certain qualities and characteristics that are applied by researchers to be studied which are then drawn to the conclusion. The population in this study was Grade VII students of SMP Muhammadiyah 1 Minggir, Sleman Regency Academic Year 2016/2017 which consists of 7 classes, namely classes VIIA, VIIB, VIIC, VIID, VIIE, VIIF, and VIIG all the classes have the same ability because they are arranged randomly. According to Sugiyono (2009: 18) samples are part of the number and characteristics possessed by the population. In this study, sampling was determined by non-random techniques. According to Sugiyono (2009: 60) Research variables are all things which are determined by researchers to be studied so that information is obtained about them, then the conclusions are danced. The variables used in this study are Numerical Ability, Learning Motivation and Learning Outcomes Mathematics.

In this study, data collection techniques using a questionnaire (questionnaire) and test techniques. According to Sugiyono (2009: 199) questionnaire or questionnaire is a data collection technique that is done by giving a set of questions or written statements to respondents to answer. Meanwhile according to Arikunto, Suharsimi (2010: 67) a test is a tool or procedure used to find out or measure something in an atmosphere, by means and rules that have been determined. The instruments used in this study were in the form of a questionnaire to determine learning motivation and questions to find out numerical abilities and student mathematics learning outcomes.

Analysis of the data used in this study was a prerequisite test consisting of a normality test using the Chi-Squared formula, a homogeneity test with a Bartlett test, and a hypothesis test. The first hypothesis test is used to find out that there is an influence of numerical ability on mathematics learning outcomes. The second hypothesis test is used to find out that there is an influence of learning motivation on mathematics learning outcomes. The third hypothesis test is used to determine the effect of numerical ability and learning motivation on mathematics learning outcomes.

RESULTS AND DISCUSSION

a. Normality test

A normality test is used to test whether the data obtained by each variable is normally distributed or not. The normality test in this study uses the Chi-Square formula. The summary of the results of the initial ability normality test can be seen in table 3.

Table 3. Summary of Test Normality in Mathematics Learning Outcomes Tests based on Numerical Ability and Learning Motivation

| Treatment | χ^2_{count} | χ^2_{table} | df | Information |
|-----------|------------------|------------------|----|-------------|
|-----------|------------------|------------------|----|-------------|

| | | | | |
|-------------|---------|--------|---|--------|
| Low – low | 0,19411 | 3,8415 | 1 | Normal |
| Low – high | 0,84002 | 3,8415 | 1 | Normal |
| High – low | 2,44608 | 3,8415 | 1 | Normal |
| High – high | 1,838 | 3,8415 | 1 | Normal |

From the normality test significant level of 5% and degrees of freedom = 2, it can be seen that in the treatment of numerical ability is low and motivation to learn is low $\chi^2_{count} = 0.19411$ and $\chi^2_{table} = 3.8415$ so that $\chi^2_{count} < \chi^2_{table}$, which means that mathematics learning outcomes are based on low numerical ability and low learning motivation with a normal distribution. In the treatment of low numerical ability and high learning motivation with a significant level of 5% and a degree of freedom = 2, it can be seen that $\chi^2_{count} = 0.84002$ and $\chi^2_{table} = 3.8415$ so that $\chi^2_{count} < \chi^2_{table}$, which means that mathematics learning outcomes are based on low numerical ability and high learning motivation with a normal distribution. In the treatment of high numerical ability and low learning motivation with a significant level of 5% and a degree of freedom = 2, it can be seen that $\chi^2_{count} = 2.44608$ and $\chi^2_{table} = 3.8415$ so that $\chi^2_{count} < \chi^2_{table}$, which means that mathematics learning outcomes are based on high numerical ability and low learning motivation with a normal distribution. In the treatment of high numerical ability and high motivation to learn with a significant level of 5% and a degree of freedom = 2, it can be seen that $\chi^2_{count} = 1.838$ and $\chi^2_{table} = 3.8415$ so that $\chi^2_{count} < \chi^2_{table}$, which means that mathematics learning outcomes are based on high numerical ability and high learning motivation with a normal distribution.

b. Homogeneity Test

The homogeneity test serves to confirm that the group has taken (the sample used in the study) has the same or homogeneous variance. The homogeneity test in this study uses the Bartlett Test. The summary of the results of the initial ability normality test can be seen in Table 4.

Table 4. Summary of Homogeneity Test Results Mathematics Learning Outcomes Test Based on Numerical Ability and Learning Motivation

| Treatment | Score |
|-------------------|-------------|
| χ^2_{count} | 2.90562 |
| χ^2_{table} | 7.8147 |
| Significant level | 5% |
| df | 5 |
| Status | Homogeneous |

From the homogeneity test at a significant level of 5% degrees of freedom = 3, it can be seen that $\chi^2_{count} = 2.90562$ and $\chi^2_{table} = 7.8147$, so that $\chi^2_{count} < \chi^2_{table}$, which means the class has the same variance (homogeneous).

c. Hypothesis testing

The summary of the hypothesis test values can be seen in Table 5.

Table 5. Summary of Hypothesis Test Results

| Source Of Variance | Sum Of Squares | Degree Of Freedom | Average Squared | f |
|-------------------------|----------------|-------------------|---------------------|-------------------|
| Treatment (A) | 1122,37 | 1 | $S_1^2 = 1122.3732$ | $f_1 = 27.049102$ |
| Block (B) | 256,992 | 1 | $S_2^2 = 256.99248$ | $f_2 = 6.1934977$ |
| Dual Factor Interaction | 167,144 | 1 | $S_3^2 = 167.14448$ | $f_3 = 4.0281682$ |
| Error | 2323,66 | 56 | $S^2 = 41.493917$ | |
| Total | 3870,17 | 59 | | |

From the first hypothesis test at a significant level of 5%, db: $V_1 = 1$ and $V_2 = 56$, the value is obtained $F_{count} = 27.049102$ were for value $F_{table} = 4.01$ so that $F_{count} > F_{table}$ which means that there is an influence of numerical ability on mathematics learning outcomes. The second hypothesis test at a significant level of 5%, db: $V_1 = 1$ and $V_2 = 56$, the value is obtained $F_{stat} = 6.1934977$ were for value $F_{table} = 4.01$ so that $F_{count} > F_{table}$ which means that there is an influence of learning motivation on learning outcomes in mathematics. The third hypothesis test at a significant level of 5%, and db: $V_1 = 1$ and $V_2 = 56$ then the value is obtained $F_{count} = 4.0281682$ VII-A for value $F_{table} = 4.01$ so that $F_{count} > F_{table}$ which means that there is an influence of numerical ability and learning motivation on mathematics learning outcomes.

CONCLUSION

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

1. There is an influence of numerical ability on mathematics learning outcomes of Grade VII students of SMP Muhammadiyah 1, 2016/2017 academic year. This can be seen from the calculations obtained namely F_{count} of 27.049102 while F_{table} at a significant level of 5%, db: $V_1 = 1$ and $V_2 = 56$ that is equal to 4.01. So obtained $F_{count} > F_{table}$, thus the first hypothesis has been tested by rejecting $H_{0,1}$ and accepting $H_{1,1}$. This shows that numerical ability affects the learning outcomes of mathematics.
2. There is a motivational effect on mathematics learning outcomes for students of class VII SMP Muhammadiyah 1 Minggir school year 2016/2017. This can be seen from the calculations obtained namely F_{count} of 6.1934977 while F_{table} at a significant level of 5%, db: $V_1 = 1$ and $V_2 = 56$ which is 4.01. So obtained $F_{count} > F_{table}$, thus the second hypothesis has been tested by rejecting $H_{0,2}$ and accepting $H_{1,2}$. This shows that learning motivation affects the learning outcomes of mathematics.
3. There is an influence of numerical ability and learning motivation on mathematics learning outcomes of Grade VII students of SMP Muhammadiyah 1 Minggir 2016/2017 academic year. This can be seen from the calculations obtained namely F_{stat} of 4.0281682 while F_{table} at a significant level of 5%, db: $V_1 = 1$ and $V_2 = 56$ that is equal to 4.01. So obtained $F_{count} > F_{table}$, thus the third hypothesis has been tested by rejecting $H_{0,3}$ and accepting $H_{1,3}$. This shows that numerical ability and learning motivation affect the learning outcomes of mathematics.

In addition, when compared to mathematics learning outcomes that have high numerical ability and high learning motivation, better than mathematics learning outcomes that have low numerical ability and low learning motivation, better than mathematics learning outcomes that have high numerical ability and low learning motivation, and better than mathematics learning outcomes that have low numerical ability and high learning motivation. While learning outcomes that have high numerical ability and low learning motivation is better than mathematics learning outcomes that have the low numerical ability and low learning motivation and are better than mathematics learning outcomes that have the low numerical ability and high learning motivation. For learning outcomes in mathematics that have the low numerical

ability and low motivation to learn the same as learning outcomes in mathematics that have high numerical ability and low learning motivation.

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