THE EFFECT OF LEARNING MODELS ON MATHEMATICS LEARNING OUTCOMES ASSESSED FROM THE ACTIVITY OF VIII

Wiwin Fajriah Hanna[a], Uswatun Khasanah[b]
Program Studi Pendidikan Matematika Universitas Ahmad Dahlan
Jalan Ring Road Selatan, Tamanan, Banguntapan, Bantul Yogyakarta
[a]wiwin1600006162@webmail.uad.ac.id, [b]uswatun.khasanah@pmat.uad.ac.id

ABSTRACT

This study aims to determine whether or not there is a significant influence (1) the learning model on the mathematics learning outcomes of VIII grade students of SMP Muhammadiyah 3 Yogyakarta Even Semester of 2019/2020 Academic Year, (2) the activity factor on the learning outcomes of VIII grade students of SMP Muhammadiyah 3 Yogyakarta Even Semester of 2019/2020 Academic Year, (3) the interaction between the learning model and the activeness of students on the mathematics learning outcomes of VIII grade students of Junior High School (SMP) Muhammadiyah 3 Yogyakarta Even Semester of the 2019/2020 Academic Year. This study's population was VIII grade students of SMP Muhammadiyah 3 Yogyakarta, consisting of 8 classes. A sample of 2 classes with 61 students was taken by random sampling technique, obtained VIII E as the experimental class and VIII F as the control class. Observation and tests are used as techniques in collecting the data. The research instrument was a test of mathematics learning outcomes and observations of student activeness. The data analysis technique used includes the prerequisite test and hypothesis testing. The results of the study with a significant level of 5% with dk: $V_1 = 1$ and $V_2 = 57$ indicate, (1) there is an effect of the learning model on mathematics learning outcomes, obtained $F_{obs}(A) = 44,390$ dan $F_{table} = F_{0,05;1;57} = 4,009$, then it is obtained $F_{obs}(A) > F_{table}$, (2) there is an influence of student activeness factors on mathematics learning outcomes, obtained $F_{obs}(B) = 39,661$ and $F_{table} = F_{0,05;1;57} = 4,009$, it is obtained $F_{obs}(B) > F_{table}$, (3) there is a significant influence of the interaction between learning models and student activeness on mathematics learning outcomes, obtained $F_{obs}(AB) = 14,731$ and $F_{table} = F_{0,05;1;57} = 4,009$, then it is obtained $F_{obs}(AB) > F_{tabel}$.

Keywords: Learning Models, Inquiry, Conventional, Activeness, Learning Outcomes

INTRODUCTION

The progress of a nation dramatically affects the quality of human resources. While the quality of human resources also affects the quality of education. Therefore the progress of a nation is determined by the quality of its education. The quality of education is determined by the results of learning in the education unit. According to Purwanto (2013: 34), Learning outcomes change students' behavior due to learning. The change was attempted in the teaching-learning process to achieve educational goals. Internationally, education in Indonesia is still rated low. Based on the results of tests and survey Programme for International Student Assessment (PISA) in 2015, followed by 72 countries. From Pisa 2015 test and evaluation results, the performance of Indonesian students is still relatively low. Indonesia is ranked 62nd. (Ministry of Education, 2016).

The results of the National Exam also show low study results. In 2019, the average national UNBK score of mathematics subjects was 45.42 (Puspendik, 2019). Students' national mathematics exam results in 2019 at SMP Muhammadiyah 3 Yogyakarta are on average 54.81, which is still relatively low. Based on SMP Muhammadiyah 3 Yogyakarta's observation results, the student's learning results are still relatively low. This can be seen from the Midterm Assessment (PTS) data in Mathematics subjects with Minimum Completeness Criteria (MCC) determined by the school, which is 75.00. The following results of PTS students at SMP Muhammadiyah 3 Yogyakarta are shown in Table 1.

Table 1. Data on Assessment Results of Midterm Mathematics Subjects SMP Muhammadiyah 3 Yogyakarta Semester Even School Year 2019/2020

Class	Average	Number of Students	
		Complete	Incomplete
VIII A	58,59	12,50%	87,50%
VIII B	59,69	37,50%	62,50%
VIII C	74,35	67,74%	32,26%
VIII D	78,28	100%	0%
VIII E	63,16	6,25%	93,75%
VIII F	51,45	0%	100%
VIII G	60,29	32,26%	67,74%
VIII H	59,21	51,61%	48,39%

(Source: SMP Muhammadiyah 3 Yogyakarta School Year 2019/2020)

Table 1 shows the results of the midterm assessment of students who are still relatively low. From the observation results in SMP Muhammadiyah 3 Yogyakarta, one of the factors that cause the low learning results of students in mathematics learning is the learning model used by teachers less varied; it appears that in the active class is only teachers, whereas students only rely on the teacher to solve a problem, making students more passive, the learning activities in the class do not run smoothly so that the results achieved are not maximal. In order for learning to be student-centered, teachers need to implement a learning model that actively engages students in teaching and learning activities.

One of the learning models that allow students to actively develop their mindset and reasoning by inviting students to find their necessary math information and concepts using the Inquirylearning model. According to Kunandar in Aris Shoimin (2017:85), The inquiry learning model is one of the models that can encourage students to be active in learning. According to Vienna in Aris Shoimin (2017: 85), Inquiry learning is a series of learning activities that emphasize critical and analytical thought processes to find answers to a questionable problem. Based on the opinions of the above experts, it can be concluded that students are encouraged to be able to formulate and answer questions to help students be active in the classroom, encourage students to be more courageous and creative to imagine, allow students to learn for themselves, and teachers to act only as facilitators. A varied learning model will affect students' learning activities. So that the activeness of students in the learning process also affects the results of learning.

According to Moedjiono and Dimyati (in Wiguna 2014) stated that Active learning is a learning process in which the student is intellectually and emotionally active so that the student seems to really play a role and participate actively in doing activities, encouragement to do something, have his own will and aspirations. As a result of observations during math defense, students tend to be passive and pay less attention to teachers. Some of the activeness of learning has not appeared in some students. This can be seen from the attitude of taking the initiative to act. The activeness or activity can form active students, develop a disciplined attitude, and a democratic learning atmosphere. The learning model applied in the classroom is less varied, teachers still dominate learning, and it is less attractive for students to be active. Based on these problems, researchers are interested in researching The Influence of Learning Models on Mathematics Learning Outcomes Reviewed from the Activeness of Students of Grade VIII SMP Muhammadiyah 3 Yogyakarta Even Semester 2019/2020.

Based on the above description can be written the following research objectives: 1) Knowing whether or not there is a significant influence of the learning model on the mathematics learning results of grade VIII students of SMP Muhammadiyah 3 Yogyakarta Even Semester of the School Year 2019/2020. 2) Knowing whether or not there is a significant effect of activeness on the mathematics learning results of grade VIII students of SMP Muhammadiyah 3 Yogyakarta Semester Even School Year 2019/2020. 3) Knowing whether or not there is a significant influence of the interaction between

the learning model on activeness and the results of learning mathematics students grade VIII SMP Muhammadiyah 3 Yogyakarta Semester Even School Year 2019/2020.

METHODS

   This research study is an experimental study consisting of 2 classes, namely the experiment class and the control class. The type of research that will be used is experimental research that is using factorial design.

Table 2. Research Design

A **Learning Model**	B **Activeness**	
	Low	**High**
Inquiry	Learning Outcomes	Learning Outcomes
Conventional	Learning Outcomes	Learning Outcomes

(Sudjana, 2002: 112)

   The above research takes two classes, an experiment class and a control class that uses the Inquiry learning model and the control class using the Conventional learning model. Once the experiment is complete, each class will be given a math test. The data from the experiment was conducted a comparison test to find or no effect.

   This research was conducted at SMP Muhammadiyah 3 Yogyakarta, which coincided at Jl. Kapten Piere Tendean No. 19, Wirobrajan, Yogyakarta city in the even semester of the 2019/2020 school year. In January 2020. A sample of 2 classes with 61 students was taken with random sampling techniques against the class obtained VIII E as an experimental class and VIII F as a control class.

   This study's data collection technique is 1) Observation, observation sheet to obtain data on student activity 2) test is used to obtain data on student math learning results. Observation data is obtained using an observation sheet on student learning activity conducted directly on students during learning activities. Observation data obtained in the form of score scoring, Yes given a score of 1 and No given a score of 0. If the student performs as written on the observation damp, then it is given the word Yes. Otherwise, if the student does not act as written on the observation sheet, it is marked No.

   An observation sheet to determine students' activeness scores using the Guttman scale can be seen in Table 3.

Table 3. Guttman Scale Category

Assessment	Value
Yes	1
Not	0

(Sugiyono, 2015: 139)

Data analysis techniques in this study are two stages, including:

1. Analysis Prerequisite Test. Before the test is done, the prerequisite test of analysis must be met, namely the normality test and homogeneity test.

 a. Normality Test. Normality tests are used to test the distribution of data obtained on each normal distributed variable or not. In this study, normality tests were conducted on student math study score scoring data, student activeness observation sheet scores, and high and low groups. The formula of the normality test, according to (Sugiono:2014:81), is:

$$\chi^2 = \sum\nolimits_{i=1}^{k} \frac{(O_i - E_i)^2}{E_i}$$

Description:

χ^2: chi-squared

K: number of groups

O_i: number of observation data

$O_i - E_i$: data discrepancy O_i with E_i

Assessment criteria:

If significant > 0.05, then the data is distributed normally

b. Homogeneity Test. Homogeneity tests are performed to determine the variance or diversity of homogeneous samples or not. In this study, homogeneity tests were conducted against data on student math study scores, student activeness observation sheet scores, and high and low groups. To test the data can be used Bartlett Test with the following formula: (Ruseffendi, 1998:297)

$$\chi^2 = dk_j \ln S_j^2 - \sum_{i=j}^{k} dk_i \ln S_i^2$$

Where:

$dk_i = n_i - 1 \, dk_j = \sum_{i=1}^{k} dk_i$

$S_j^2 = \frac{\sum_{i=1}^{k} dk_i \ln S_i^2}{dk_j}$

Description:

k: number of samples;

S_i^2: variant sample ke-i;

n_i: many samples of i;

S_j^2: combined variance;

$(n_i - 1)$: the degree of freedom of each group

Test criteria:

If $\chi_{count}^2 \leq \chi_{table}^2$, then homogeneous sample variance

If $\chi_{count}^2 > \chi_{table}^2$, then the sample variance is not homogeneous

A significant level of 5% and a degree of freedom (dk) = k – 1

2. Hypothesis Test. Hypothetical tests use Variance Analysis or ANAVA to calculate statistics F to perform statistical tests.

RESULTS AND DISCUSSIONS

The normality test was conducted in the experiment and control class with a significant level of 5%. As a result, $\chi_{count}^2 < \chi_{table}^2$ then H$_0$ is accepted, which means that the experiment class and control class are distributed normally.

Homogeneous tests were conducted in the experiment and control classes with a significant level of 5%. As a result, $\chi_{count}^2 < \chi_{table}^2$ then H$_0$ is accepted, which means that the experiment class and control class are homogeneous.

Based on the ANAVA test, for the first hypothesis, $F_{obs}(A) = 44,3904347$ while F_{tabel} at a significant level of 5% degree of freedom $V_1 = 1$ and $V_2 = 57$, which is equal to 4,00986792. So it is obtained $F_{obs}(A) > F_{table}$; thus, the first hypothesis has been tested by receiving H$_{1.1}$. This shows an influence of learning model factors on learning mathematics in grade VIII students of SMP Muhammadiyah 3 Yogyakarta even semester of the 2019/2020 school year.

The study results are in Vienna's opinion in (Aris Shoimin: 2017; 85) the inquiry learning model is a series of learning activities that emphasize the critical and analytical thought process of finding and finding the answer to a problem. By implementing the learning model of inquiry students can become more active in the learning process and lead students to have a learning experience in discovering material concepts, as well as the inquiry learning model of implementing an Open-ended topic system to make students better understand the materials taught because the themes learned are not limited to anywhere. Students have the opportunity to make their discoveries to produce optimal learning outcomes. This underlies the influence of learning model factors on students' math learning outcomes.

The second hypothesis is obtained $F_{obs}(B) = 39,6613408$ while F_{tabel} at a significant 5% degree of freedom $V_1 = 1$ and $V_2 = 57$, equal to 4,00986792. So it is obtained $F_{obs}(B) > F_{0,05;1;57}$ thus, the second hypothesis has been tested by receiving $H_{1.2}$. This shows active factors on learning mathematics in grade VIII students in the even semester of SMP Muhammadiyah 3 Yogyakarta school year 2019/2020.

The study results agree with Moedjiono and Dimyati (Wiguna et al., 2014), stating that learning activity is a learning process in which the student is intellectually and emotionally active. Until students' activeness seems to play a role, and participate actively in doing activities, encouragement to do things, have their own will and aspirations. Active students will spontaneously work on the math problems that the teacher is given because they will try to solve them to get good results. This underlies the influence of student activity factors on students' math learning outcomes.

The third hypothesis was obtained $F_{obs}(AB) = 14,7310003$ while F_{tabel} at a significant 5% degree of freedom $V_1 = 1$ and $V_2 = 57$, equal to 4,00986792. So it is obtained $F_{obs}(AB) > F_{0,05;1;57}$ thus, the third hypothesis has been tested by receiving $H_{1.3}$. This shows an influence of interaction between learning models and student activity on math learning results in grade VIII students of the even semester of SMP Muhammadiyah 3 Yogyakarta school year 2019/2020.

The study results agree with Kunandar in (Aris Shoimin: 2017; 85) the inquiry learning model is a learning activity that encourages students to learn actively with concepts. Teachers encourage students to have experience and conduct their experiments or discoveries. The inquiry learning model implements an Open-ended topic system to understand better the materials taught because the themes studied are unlimited and can be sourced from textbooks, the internet, and others. Active students will spontaneously work on the math problems that the teacher is given because they will try to solve them to get good results. This underlies the influence of interaction between learning models and student activity on math learning outcomes.

CONCLUSION

Based on the results of the research and discussions that have been outlined, the conclusions of the study can be drawn, namely:

1. There is an influence of the learning model on learning mathematics in grade VIII students of SMP Muhammadiyah 3 Yogyakarta Semester Even School Year 2019/2020. This is demonstrated by hypothetical test results with a significant level of 5% and degrees of freedom: $V_1= 1$ and $V_2=57$, obtained $F_{obs}(A)=44,3904347$ and $F_{table}=F0,05;1;57 = 4,00986792$ consequently $F_{obs(A)} > F_{table}$ so $H_{0,1}$ is rejected and $H_{1,1}$ accepted.

2. There is an effect of student activity on learning mathematics in grade VIII students of SMP Muhammadiyah 3 Yogyakarta Semester Even School Year 2019/2020. This is demonstrated by hypothetical test results with a significant level of 5% and degrees of freedom: $V_1= 1$ and $V_2=57$, obtained $F_{obs(B)} = 39,6613408$ and $F_{table}= F0,05;1;57=4,00986792$ consequently $F_{obs(B)} > F_{table}$ so $H_{0,2}$ is rejected and $H_{1,2}$ accepted.

3. There is an interaction between the learning model and students' activeness in learning mathematics in grade VIII students of SMP Muhammadiyah 3 Yogyakarta Semester Even School Year 2019/2020. This is indicated by hypothetical test results with a significant level of 5% and degrees of freedom: $V_1=1$ dan $V_2=57$, obtained $F_{obs(AB)} =14,7310003$ and $F_{table} =F0,05;1;57 = 4,00986792$ consequently $F_{obs (AB)} > F_{table}$ so $H_{0,3}$ is rejected and $H_{1,3}$ accepted.

REFERENCES

Purwanto. 2013. Evaluasi Hasil Belajar. Yogyakarta: Pustaka Pelajar.

Ruseffendi, 1998. Statistika Dasar untuk Penelitian Pendidikan. Bandung: IKIP Bandung Press.

Shoimin, Aris. 2017. 68 Model Pembelajaran Inovatif dalam Kurikulum 2013.Yogyakarta : Ar-Ruzz Media Sudjana. 2002. Desain dan Analisi Eksperimen. Bandung: PT.Tarsito.

Sugiono. 2014. Statistik untuk Penelitian. Bandung: Cv. ALFABETA

Sugiono. 2015. Metode Penelitian Pendidikan Kuantitatif, Kualitatif, dan R&D. Bandung: Cv. ALFABETA.

Wiguna, Marhaeni, dan Ardana. (2014). Pengaruh Model Pembelajaran Berbasis Masalah Berbantuan Hands on Mathematics terhadap keaktifan dan hasil belajar matematika siswa kelas V di SD 1.2.5 Banyuasri. Jurnal Program Studi Pendidikan Dasar UPG. Bali.