Journal of Mathematics Instruction, Social Research and Opinion
Vol. 1, No. 2, July 2022, pp. 73~82, https://doi.org/10.58421/misro.v1i2.20
ISSN 2962-7842

The Comparison of Students Mathematics Learning Outcomes Between Using Performance Assessment and Self-assessment

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Article Info

Keywords:

Performance Assessment
Self-assessment
Students Learning Outcomes

ABSTRACT

A good assessment covers three aspects: cognitive, affective, and psychomotor. Many teachers tend to assess only the cognitive aspect. This problem requires treatment in the form of appropriate assessment so that the development of student learning outcomes not only covers the knowledge aspect only. This research aims to find out the result of students learning outcomes in a group of mathematic learners after being given treatment in the form of performance assessment and self-assessment and find out which treatment gives better results amongst students who are treated in the form of performance assessment and self-assessment. This research is an experimental study. The population taken is all students in grade X of MA Ash-Siddiqiyyah. The sample was taken based on purpose, namely purposive sampling. The class used as the experimental class I is class X IPA 1, which amounted to 30 students, and class X IPS 2, which amounted to 30 students, is experimental class II. Based on the results obtained, the average student learning outcomes in experimental class I is in the high category with an average number gain value of 0.71. The average student learning outcomes in experimental class II are in the medium category and are shown by the average number of gain values of 0.64. Based on the hypothesis test results, the decision is to reject Ho and accept Ha. Then it can be concluded that the results of student learning in the learning group treated by performance assessment are better than student learning outcomes in the learning group treated with self-assessment.

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1. INTRODUCTION

Education is an absolute necessity for a nation because it is not only a reflection but also to equip the next generation in the face of changes the next day. Education not only becomes one of the essential components to establishing a nation-qualified, but education is also becoming an effort to improve the quality of human resources. The importance of education tells us the value of education in our life. Education means a lot in everyone's

life as it facilitates our learning, knowledge, and skill. Related to the efforts to optimize human resources, education should be designed in such a manner about the curriculum, the learning process, and all matters relating to the educational system to obtain maximum results and then the learning process be effective and efficient. Not only that, Innovation and absolutely evaluations are conducted to measure educational progress.

Education is a conscious effort of a person or group to educate students with a process with goals. Achieving the objectives of education requires a long process; media as a tool has goals and goals planned. It is inappropriate to educate without a purpose and program. However, the problem of education and learning is inevitably a very complex unity with many factors influencing it so that the objectives of learning designs that have been formulated will not be easily achieved. The factors that may hinder the development of education and learning can be minimized by constantly innovating the learning process [1]–[5].

Educational success can be seen from the learning outcomes objectives formulated in lesson planning. The learning objectives consist of cognitive, affective, and psychomotor. However, in the natural learning process – especially in this research place, based on the interview with one of the students – teachers often ignore the affective and psychomotor aspects. They always emphasize cognitive achievement. This phenomenon becomes why the learning process – especially in Indonesia, looks pretty monotonous, which means less quality and reduces the student's enthusiasm for learning [6]–[9].

The teacher is one of the most crucial components of education and learning. The ability of teachers to choose the approach, methods, strategies, and assessments used in the learning process is essential to student success. While intelligence, interests, talents, preparedness, activeness, and awareness about the importance of education and the learning process is very influential on the results of their learning. Based on interviews with teachers who taught math lessons at the school, students often feel reluctant to activate in the learning process. They often sleep in the classroom while learning takes place and ask permission to come out with reasons to go to the bathroom, etc. This may be due to students' interest in learning math being less.

Mathematics is a field of study that significantly influences the development of other sciences. However, getting good math results is certainly not easy because of the complexity of the problems in education and teaching [10]–[13]. Nevertheless, the problems faced are not all the responsibility of a math teacher. Other components that parties concerned in the education system were also involved. Therefore, there should be an effort to improve the quality of education and learning in both learning and assessment. The evaluation was done to control the quality of education nationally as a form of accountability for education providers to the concerned parties, including the learners, institutions, and educational programs [14].

Assessment is an essential component of a learning program [15]. The quality of learning can be seen from the assessment results. With the conducting evaluation of the learning program, the teacher can determine the ability of the students, which student that is understood and which student is not understood, determine the extent of students' understanding of the material that has been taught, and find out whether the method has been

used appropriately or not [16]. However, the evaluation should be done continuously to allow an overview of the student's capabilities [17].

Assessment of learning outcomes not only can be done through a written test. Nevertheless, it also can be done by non-test such as observation, interview, checklists register, and other techniques. However, as previously disclosed, teachers prefer to assess students by written tests for the easy tools to make. This tendency impacts the evaluation of students learning outcomes are varied and sometimes does not correspond to the student's understanding. Another way that can be used to measure students learning outcomes is by evaluation based on a process which is in simulations may use the mentioned non-test techniques [18]–[20].

The responsibility of teacher as teachers and educators have the consequences of creating students who are oriented to the three aspects become the reason researchers wanted to investigate further evaluation based on a process with non-test techniques used performance assessment and self-assessment that can assess all aspects both cognitive, affective, and psychomotor aspects. Furthermore, to compare both performance assessment and self-assessment. Is any difference in students' mathematics learning outcomes between performance assessment and self-assessment?

2. METHOD

A study requires an appropriate research design and method with the situation and condition that will be studied for the study can be conducted well and according to expectations. In line with the purpose of the study, this study was conducted with the quantitative method and experimental study. This experimental study was conducted to determine the effects of a given treatment intentionally by the researcher. In this study, the researcher conducted the quasi-experimental study because this study required an experimental class and control class, while researchers can not randomly select a subject from the population because the subject has naturally formed in one big group.

The design used in this research is the static group pre-test design. In this model, two groups were given different treatments in one similar clump [21]. There are two groups of experiments using different evaluation techniques. The first is an experimental class using performance assessment (Science I), while the second uses self-assessment (Social 2). Before the researcher gave the treatment, the researcher used a pre-test at the beginning and then gave some treatment. After being given treatment during the learning process, the researcher used a post-test to determine student learning outcomes obtained after getting treatment by using different valuation techniques.

To find out students' learning outcomes requires a measuring instrument. In this study, the researcher only used a test as the research instrument. A test is a tool used to measure the knowledge, skills, and talents of individuals or groups. In collecting the data to measure student learning outcomes in mathematics, the researcher used a test instrument in the form of a multiple-choice test. The results were obtained by giving a pre-test first and then giving a post-test to know student learning outcomes (variable Y) after giving treatment using performance assessment (variable X_1) in class X Science 1 and self-

assessment (variable X_2) in class X Social 2. It is seen from the differences in students' achievement between the value pre-test, post-test, and index students' index gain value.

After collecting the data, then the data is analyzed to find answers to the research questions that have been formulated. To answer research questions number (1) dan (2) analysis technique used is the analysis of variance (ANOVA) and statistical analysis to answer research question number (3). Analysis of variance is used to answer the question of how students' mathematics learning outcomes who were treated in the form of performance assessment and how students mathematics learning outcomes who were treated in the form of self-assessment, while analysis inference is F-test be used to answer the questions about is any difference between students mathematics learning outcomes who were treated in the form of performance assessment and self-assessment. F-test first with the formulation of the hypothesis as follows:

H : Data comes from two population groups with equal variance

Ha : Data comes from two population groups with different variances.

Table 1. F-Test Two-Sample for Variances

	Variable 1	Variable 2
Mean	70,800100930	64,568331890
Variance	111,381049000	114,284631400
Observations	30,000000000	30,000000000
Df	29,000000000	29,000000000
F	0,974593413	
P(F<=f) one-tail	0,472615106	
F Critical one-tail	0,537399965	

Based on the results obtained, H accepted the decision because the probability of 0.47 is more significant than the significance level of 0.05. So it can be concluded that the data comes from two population groups with the same variance; therefore, the following hypothetical test selected t-test two samples assuming variance for further calculations.

Table 2. Two-Sample Assuming Equal Variances

	70,14925	59,70149
Mean	70,82254	64,73615
Variance	115,3433	117,4911
Observations	29	29
Pooled Variance	116,4172	
Hypothesized Mean Difference	0	
Df	56	
t Stat	2,148005	
P(T<=t) one-tail	0,018027	
t Critical one-tail	1,672522	
P(T<=t) two-tail	0,036054	
t Critical two-tail	2,003241	

Based on table 2, the decision is to reject H_0 and receive H_a because the probable 0,03 is more significant than the significance leveling 0.05. So it can be concluded that there are significant differences between the learning outcomes of students in the learning groups who were given treatment in the form of performance assessment and those in the form of self-assessment. Based on these results, the student's mathematical learning outcomes, when treated in the form of performance assessment, are better than students' mathematical learning outcomes treated in the form of self-assessment.

3. RESULTS AND DISCUSSION

A hypothesis can provide conclusions on a study through various procedures. This study aims to take quantitative data calculated procedurally to obtain a hypothetical decision. It uses an experimental study. The samples were two classes. The first was class X Science 1, taken as the experimental group, and the second was class X Social 2, taken as the control group. The result of a study conducted at MA AshShiddiqiyyah are as follows:

3.1. Student Learning Outcomes of Experimental Class 1

The experimental class conducted in class X Science 1 consisted of 30 students. At first, experimental class 1 students were pre-tested to determine their ability. Then they were given treatment by using a performance assessment on mathematics about equality and inequality of absolute value of one variable. After getting the treatment, they conducted a post-test to investigate gain value (the value of increasing learning outcomes from pre-test to post-test).

Table 3. Statistical Description of Students' Learning Outcomes of Experimental Class 1

Statistics

		Pretest	Posttest	Gain (%)
N	Valid	30	30	30
	Missing	0	0	0
Mean		44,400	83,533	70,793
Std. Error of Mean		1,2942	1,2343	1,9267
Median		47,000	83,500	71,200
Mode		47,0	80,0	55,0[a]
Std. Deviation		7,0886	6,7606	10,5529
Variance		50,248	45,706	111,363
Skewness		-,295	-,098	,042
Std. Error of Skewness		,427	,427	,427
Kurtosis		-1,126	-1,051	-1,179
Std. Error of Kurtosis		,833	,833	,833
Range		20,0	20,0	31,8
Minimum		33,0	73,0	55,0
Maximum		53,0	93,0	86,8
Sum		1332,0	2506,0	2123,8

a. Multiple modes exist. The smallest value is shown

Table 3 above showed that the mean, median, mode, minimum, and maximum on pre-test and post-test increased. At the same time, the average gain value of pre-test and post-test was 0,71 and based on the classification that has been set up classified into high category.

3.2. Students Learning Outcomes of Experimental Class 2

The experimental class 2 conducted in class X Social 2 consisted of 30 students. The same experimental class 1 to find out their ability, experimental class 2 students carried out a pre-test, then they were given a different treatment by using self-assessment on mathematics about equality and inequality of absolute value of one variable. After getting the treatment, they conducted a post-test to investigate gain value (the value of increased learning outcomes from pre-test to post-test).

Table 4. Statistical Description of Students' Learning Outcomes of Experimental Class 2

Statistics

		Pretest	Posttest	Gain (%)
N	Valid	30	30	30
	Missing	0	0	0
Mean		35,067	77,167	64,573
Std. Error of Mean		1,8364	1,3166	1,9520
Median		33,000	80,000	64,300
Mode		33,0[a]	80,0	55,0
Std. Deviation		10,0582	7,2115	10,6914
Variance		101,168	52,006	114,305
Skewness		-,085	-,002	-,014
Std. Error of Skewness		,427	,427	,427
Kurtosis		-,807	-1,259	-,816
Std. Error of Kurtosis		,833	,833	,833
Range		33,0	20,0	37,2
Minimum		20,0	67,0	45,0
Maximum		53,0	87,0	82,2
Sum		1052,0	2315,0	1937,2

a. Multiple modes exist. The smallest value is shown

Table 4 above showed that the mean, median, mode, minimum, and maximum on pre-test and post-test increased. At the same time, the average gain value of pre-test and post-test was 0,64, and based on the classification that has been set up classified into medium categories.

3.3. Discussion

Education is an effort to improve the quality of human resources, which is carried out to prepare guidance for life in the future. In education, known terms measurement, assessment, and evaluation differ. Measurement and assessment are evaluation processes. Evaluation has many techniques. This study compares two evaluation techniques based on a process that requires interpretation of learning outcomes through performance assessment and self-assessment so that learning outcomes include cognitive, affective, and psychomotor aspects.

In the preliminary study, through interviews with Mrs. Fally as a mathematics teacher in grade X (ten) of MA AshShiddiqiyyah Cirebon with aims to determine students' ability based on the class's average value, and the interview got the average value of the

student's daily re-examination. Class X Science 1 with an average of 74.8, class X Social 2 with an average of 72.9. From the data obtained, the writer, with the supervisor's guidance, decided on class X, science one, and X social two as the sample research. This is because the number of students in both classes is the same and the ability of objects to be compared is not much different.

Assessment is essential in the learning process that determines the success level, the advantages, the disadvantages, and what things need to be fixed in the learning process. Looking from the viewpoint of deficiencies and advantages, performance assessment and self-assessment may affect students learning outcomes. Reviewed student learning outcomes, treatment in the form of performance assessment given to students in mathematics learning has some progress that researcher observed from knowledge, skill, and attitude. What are the knowledge of students is more developed, they are more confident, creativity and skills are increased, they have insight into the environment, solid responsible for doing tasks and respecting the opinions of friends each other. Students present the result of their discussions and observations well, so it can be concluded that this treatment covers three aspects well.

Treatment in the form of self-assessment that has been given to students in mathematics learning reviewed from students learning outcomes has some progress that researcher observed from knowledge, skill, and attitude. What are the knowledge of students is more developed, students realize their weaknesses and advantages, so they know what they have to do in the next lesson, they are more actively inquiring, the active discussion so that their knowledge and insight increased, then they are more confident to analyze their learning progress. However, teachers or researchers still find some students who are less honest when filling out a self-assessment form. This is one of the deficiencies of self-assessment.

The assessment and data analysis results showed that students learning outcomes after being given treatment in the form of performance assessment and self-assessment have increased. It can be proven from the enhancement of pre-test values and post-test values. It is known that the average pre-test value for the mathematics learning group before being given treatment in the form of performance assessment is in the excellent category with numbers 44,4. Furthermore, the average post-test value for the mathematics learning group after being given treatment in the form of performance assessment is in an excellent category with numbers 83,5. Ang gain value is 70,7, classified into the High category.

The average pre-test value for the mathematics learning group before being given treatment in the form of self-assessment is low enough with numbers 35,1. Furthermore, the average post-test value for the mathematics learning group after being given treatment in the form of self-assessment is in the excellent category with numbers 77,2. Moreover, the gain value is 64,6, classified into the medium category. Based on the description of the results, the group of mathematics learning treated by performance assessment and the group of mathematics learning treated by self-assessment has increased learning outcomes. Based on these results, the results of student learning in the mathematics learning groups

treated in the form of self-assessment were better than students learning outcomes in mathematics learning groups treated in the form of performance assessment.

The results of statistical tests showed significant differences between students learning outcomes in mathematic learning groups who were treated in the form of performance assessment and the form of self-assessment. This matter can be seen from the probability value 0,03, which is smaller than the level of signification 0,05; the decision rejects Ho and accepts H. The results show that there is conformity with the assumption of the author's framework supported by the theoretical reference on performance assessment and self-assessment. These assumptions indicate a significant difference between the learning outcomes of students in learning groups who were treated in the form of performance assessment and those treated in the form of self-assessment. Implementing treatment in the form of performance assessment and self-assessment positively affects the development of student learning outcomes. Performance assessment and self-assessment have output learning outcomes covering cognitive, affective, and psychomotor aspects.

The learning outcomes obtained by students can prove that the learning process that includes cognitive, affective, and psychomotor aspects is better than the learning process that only covers the cognitive aspect. The hypothesis test result showed a significant difference between the mathematics learning group treated in the form of performance assessment and the mathematic learning group treated in the form of self-assessment. This can be seen from the students learning outcomes who were treated in the form of performance assessment experienced more significant improvement than the students learning outcomes who were treated in the form of self-assessment. This difference is also due to several factors, such as students in learning groups who were treated in the form of performance assessments feel more competitive during the presentation task because they feel their performance will be judged in such a way either presenting the material, improvisation of the slide show, the activeness during the question and answer session, or the response to the opinions of friends. In contrast, the students in the learning group treated in the form of self-assessment are not as competitive as the experimental class students. This is why students learning outcomes in experimental classes are better than those in the control class. However, these two assessment techniques can improve students learning outcomes.

4. CONCLUSION

The research aims to determine which treatment gives better results between the mathematics learning groups treated by performance assessment and those treated by self-assessment. Under the collected and analyzed data, it can be concluded that the average of the students learning outcomes in the mathematics learning group treated with performance assessment is in the high category and shown by the average gain of 70,7%. It means the implementation of performance assessment can improve students learning outcomes well.

The average of the students learning outcomes in the mathematics learning group treated in the form of self-assessment is in the medium category and shown by the average gain rate of 64,5. It means the implementation of self-assessment can improve students learning outcomes well enough. Based on the hypothesis test results, the decision was

taken to reject Ho and accept Ha because the probability of 0.03 is smaller than the significance level of 0.05. Based on the results obtained can also be said that the learning outcomes of students in the mathematics learning groups who were treated in the form of performance assessment is better than student learning outcomes in the learning group who were treated in the form of self-assessment because the index gain value of performance assessment is more significant than index gain value of self-assessment.

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ISSN 2962-7842