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Influence of Demonstration Methods and Student's Activity on Learning Outcomes

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Abstract
This research is motivated by the fact in the field that the fourth-grade students' mathematics learning outcomes are still low in Public Elementery School 16 Bengkulu City. This is presumably, the lack of application of demonstration methods and student activeness towards student learning outcomes. On this basis, this study is focused on discussing mathematics learning using demonstration methods. The problem of this research is the low student learning outcomes and the students' lack of understanding of the broad and perimeter material. The purpose of this study was to determine the effect of demonstration methods and student activeness on mathematics learning outcomes of fourth-grade students of SD Negeri 16 Bengkulu City. This type of research is a quantitative study with an experimental method approach. Data collection techniques using observation, tests and documentation. The data analysis technique used the t test. The result of this research is the demonstration method and student activeness have a significant effect. So it can be concluded that the higher the student's activity, the higher the learning outcomes and the demonstration method as well as the learning outcomes, which means that the working hypothesis (Ha) in this study is accepted, that is, there are differences in student activeness in the control and experimental classes.

Keywords: Demonstration Method, Student Activity and Learning Outcomes

1. Introduction

Education is a process in order to influence students to be able to adapt as best as possible to their environment, thereby causing changes to themselves that allow them to function properly in community life (Andiyana et al., 2018). With the existence of quality human resources, it is hoped that they can contribute to development regardless of the burden of the education budget because education is one of the important factors in the development of the nation and state. One of the efforts to improve the quality of education in schools is by

making innovations in the teaching and learning process. The meaning of education itself is stated in Law no. 20 of 2003 Chapter 1 Article 1 (paragraph 1) concerning the National Education System. "Education is a conscious and planned effort to create an atmosphere of learning and the learning process so that students actively develop their potential to have religious-spiritual strength, self-control, personality, intelligence, noble morals, and skills needed by themselves, society, the nation and the state" (Risdianto, 2019). Mathematics learning is a process of building students' understanding of facts, concepts, principles and skills according to their abilities, teachers or lecturers in delivering teaching material, students with their respective potentials confront their understanding of facts, concepts, principles and skills as well as problem solving. As a mathematics teacher requires appropriate teaching methods so that teaching as a process of giving treatment to students is more focused, regular and not arbitrary or just teaching (Hamzah, 2016). Students will be happy if the learning that takes place is not monotonous and creates a pleasant learning atmosphere. Moreover, mathematics subjects must be appropriate methods and supported by learning media.

The use of learning methods that are not in accordance with the objectives of teaching will become an obstacle in achieving the goals that have been formulated. Quite a lot of learning materials are wasted just because of the use of methods according to the wishes of the teacher and ignoring the needs of students (Matulnaimah, 2018). The continuity of learning methods with others is an important thing that cannot be taken lightly.

Based on preliminary observations carried out at Public Elementary School 16 Bengkulu City, the low learning outcomes of elementary school students in mathematics were due to several things, for example: 1) Learning is only fixated on the teacher, 2) Students are less interested in learning mathematics because it is boring, 3) Teachers are less creative in using it. method 4) Students have not been actively involved in learning because they only listen to the teacher explain. To improve student learning outcomes with fun learning in mathematics on the material of calculating the circumference and area of squares and rectangles the teacher can use the demonstration method (Ahmad & Nasution, 2018). This demonstration learning method can be used to describe the shape of the perimeter and area of squares and rectangles. This method is similar to the realistic mathematics learning method developed by Ardiyani (2018) but with some differences because this demonstration method makes representations of the outside into the classroom. Mathematics learning outcomes can be improved by learning digital learning as was done by Lin and Chen (2017), besides that also by using the mathematics learning module developed Dan *et al.* (2014; Djafar *et al.*(2019); dan Lestari *et al.*, (2020). This study seeks to reveal other variables that can improve mathematics learning outcomes. These variables are demonstration learning methods and learning activities.

2. Methods

The type of approach used in this research is a quantitative approach, a quantitative approach is an approach that uses numbers, statistical processing, culture and controlled experiments (Hermawan, 2019). This method is used when the experimental class and the control class are naturally the same intact class. In this intact class, there is an experimental class and a control class which have the same competence. Students are given different treatments, namely one experimental class and one control class. The experimental class used the demonstration method and the control class without using the demonstration method to determine the student's mathematics learning outcomes (Mertler, 2017; Privitera, 2016; Saregar et al., 2019).

The experimental research design used was pretest-posttest, non-equivalent control group design to find data on the effect of demonstration methods on student mathematics learning outcomes. Pretest-posttest, non-equivalent control group design, where a group of subjects is taken from a certain population and carried out a pretest then subjected to treatment in a row (Riyanto & Hatmawan, 2020). After treatment, the subject was given a posttest to measure learning outcomes in the group. The evaluations given carry the same weight. The difference between the pretest and posttest results shows the results of the treatment that has been given. Based on the explanation above, it can be described the Group Design Non-Equivalent Control Scheme in table 1.

Table 1: Research Design Scheme

O_1	x	O_2
O_3	-	0_4

(Source: Sugiyono,2006)

Information:
Experimental class: The class or group that is given treatment.
Control class: Class or group that is not treated.
01: Pretest Results of the experimental group before being given treatment
02: The posttest results of the experimental group after being given treatment
03: The results of the control group pretest before being given treatment
04: Results of the control group posttest
X: Treatment given to the experimental group
-: There was no treatment in the control group.

In this study, researchers conducted two tests in each group. The pre-test was carried out on the experimental group and the control group to find out the results of the initial learning test before being given treatment. Then in the final test the experimental group was given treatment in the form of the use of demonstration methods and student activeness by observation using the Guttman scale. Meanwhile, the final test of learning in the control group was carried out without treatment. After the two groups did the final test, the results of the two groups were then compared or tested for differences. The significant difference between the two scores in the experimental group and the control group will show the effect of the treatment that has been given (Hermawan, 2019). In this study, the population was all fourth grade students at Public Elementary School 16 Bengkulu City in the 2019-2020 school year, which were divided into 4 classes namely 4^{th} A, 4^{th} B, 4^{th} C and 4^{th} D.

Observation technique was conducted with an check list instrument, namely observing and assessing how the method was applied during the learning process. By using data collection techniques in the form of measurement techniques. The reason the researcher uses the measurement technique is to measure the learning outcomes obtained by students after carrying out learning activities carried out in the experimental class and the control class. The data collected this study is quantitative data form average value of student learning outcomes obtained from the posttest results. Based on the data collection techniques used, the data collection tool was in the form of test questions. According to (Yusup, 2018), This study uses construct validity or expert validity which aims to see the suitability of the questions with indicators, basic competencies, and competency standards that exist in the 2013 curriculum that is currently used. Construct validity uses expert opinion to determine whether the questions are valid or not.

Perform data normality test using Chi Square. The group data normality test was carried out using the test X^2 (Sukestiyarno & Agoestanto, 2017). Here's the calculation formula Chi Square :

$$X^2 = \sum \frac{(fo-fh)^2}{fh} \quad (1)$$

Information:
X^2 = Chi Square
Fo = observed frequency
Fh = expected frequency

Knowing the differences in student learning outcomes in class. To answer the hypothesis in this study will use the t-test. The t test will use a significant value α = 0,05%. The t test used in this study is a type of t-test-collected variance (Lia et al., 2020). The following is the t-test polled variance formula that will be used :

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1-n_2)S_1^2+(n_2-1)S_2^2}{n_1+n_2-2}\left(\frac{1}{n_1}+\frac{1}{n_2}\right)}} \quad (2)$$

Information:
S_1^2= variance of the experimental class
S_2^2= control class variance
$\bar{X}_1$= mean value of the control class
$\bar{X}_2$= average value of the experimental class
n_1= number of samples in the experimental class
n_2= number of samples for the control class
The testing criteria with a significance level of 5%, namely: (a) The value of t count > t table, then the null hypothesis (Ha) is accepted. (b) The calculated t value <t table, then the alternative hypothesis (Ho) is accepted
Knowing how much influence the application of the Inquiry learning model has on student learning outcomes can be measured by the Effect Size. The Effect Size formula is as follows:

$$ES = \frac{(\bar{Y}_e - \bar{Y}_C)}{\bar{S}_c} \quad (3)$$

Information:
E*S*= *Effect Size*
$\bar{Y}_e$= Mean Value Experimental Group
$\bar{Y}_C$= Mean Value Comparison Group
$\bar{S}_c$= Standard Deviation Comparison Group
(Amalia et al., 2020)

3. Results

Based on research conducted on the formulation of the problem, namely whether there effect student activeness mathematics learning outcomes fourth grade students Public Elementery School 16 Bengkulu City, it can be seen that the results of the calculations are as follows:

1. Finding the mean variables X and Y
   a) Finding the mean variable X
      Mean $X_1 = \frac{Fx}{N} = \frac{1965}{32} = 61{,}40$
   b) Finding the mean variable Y
      Mean $X_2 = \frac{Fy}{N} = \frac{1650}{32} = 51{,}56$
2. Looking standard deviation of the value of the variables X and Y
   a) Looking standard deviation of the value of the variable X

SD = $\sqrt{\frac{\sum X^2}{n}} = \sqrt{\frac{3511{,}72}{32}} = \sqrt{109{,}74} =$ 10,47

   b) Finds the standard deviation of the Y variable

SD = $\sqrt{\frac{\sum y^2}{n}} = \sqrt{\frac{2932{,}09}{32}} = \sqrt{91{,}62} =$ 9,5

3. Find the variants of the X and Y variables
   a) Looking for variants of the observation results of class IV D

$S^2 = \frac{N\sum x^2-(\sum x)^2}{n(n-1)} = \frac{32.124175-(1965)}{32(32-1)}$

$= \frac{3973600-3861225}{32(31)} = \frac{112375}{992}$

$S1^1 = \sqrt{113{,}28}$ =10,64

   b) Looking for variants of the observation results of class IV C

$S^2 = \frac{N\sum y^2-(\sum y)^2}{n(n-1)} = \frac{32.88150-(1650)}{32(32-1)}$

$$= \frac{2820800-2722500}{32(31)} = \frac{98300}{992}$$

$$S1^2 = \sqrt{99,09} = 9,95$$

4. Looking for an interpretation of it

$$T = \frac{X_1 - X_2}{\sqrt{\frac{S_1^2}{n1} + \frac{S_2^2}{n2}}} = \frac{61,40-51,56}{\sqrt{\frac{113,28}{32} + \frac{99,09}{32}}}$$

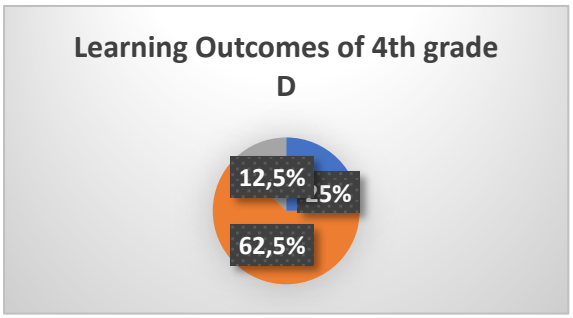
$$= \frac{9,84}{\sqrt{\frac{212,37}{32}}} = \frac{9,84}{\sqrt{6,636}} = \frac{9,84}{2,57} = 3,828$$

Before consulting with the t table, it was determined that df or db = (N1 + N2) - 2 = (32 + 32) - 2 = 62. Based on the above calculations, when consulted with t table with df (to 64) at the 5% significant level, namely 1.998. Therefore t count > t table (3,828 > 1,998) which means the working hypothesis (Ha) In this study it was accepted, namely that there was an effect of student activeness on mathematics learning outcomes fourth grade in public elementary school students of Bengkulu City.

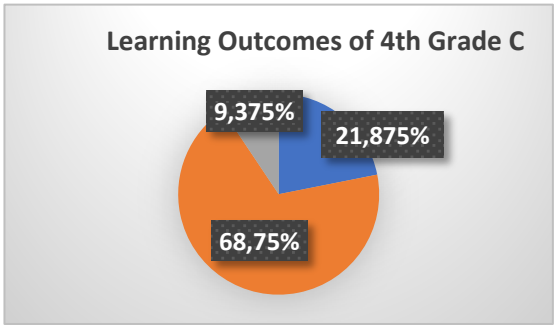
The learning method using the demonstration method is a learning concept that can help teachers in delivering easy material, and will make students happy to do learning (Dewi, 2018). The material previously understood by students with difficulty, after this method became easier. From the learning results, if it is observed that the interest in learning mathematics using this demonstration method, students look more enthusiastic about learning, and it is easier to understand the material. Classes that are taught using the demonstration method show a feeling of pleasure in mathematics.

Based on the research data that has been analyzed, it can be seen that the researcher plays a direct role as a mathematics teacher in 4th grade on the area and circumference of a square and a rectangle. 4th grade D students as objects totaling 32 students who are given treatment in the form of demonstration methods and 4th grade C as objects totaling 32 students who are given treatment without using demonstration methods.

Before being given the treatment, a pretest was held to determine the students' initial ability to the material being tested. In working on this pretest, students generally only worked on questions according to their makeshift abilities. This is because the material being tested (pretest) has not been taught. The students' achievement in the form of the average pretest score for 4th grade D was 47.71 and 4th grade C was 46.25 then the upper, middle and lower categories were determined. When viewed from the pretest average of the two classes there is no significant difference (same). To prove whether the achievement of the two groups is homogeneous or not, a variance (homogeneity) test is performed). From the homogeneity test (test “F”) obtained results Fhitung < F tabel (1,17 < 1,82) then the pretest data variance is homogeneous (same), so it can be said that the abilities of the two classes are the same and can be used as research samples based on the normality test. Next is to do learning with the demonstration method in 4th grade D. So that the posttest ability in 4th grade D is obtained using the demonstration method with an average of 75.81.

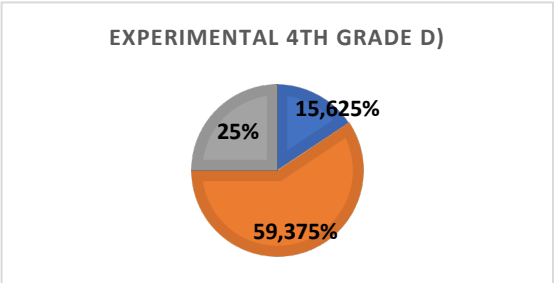


When viewed from the frequency of the results, there were 8 students in the upper group (25%), 20 students in the middle group (62.5%), and 4 students in the lower group (12.5%).

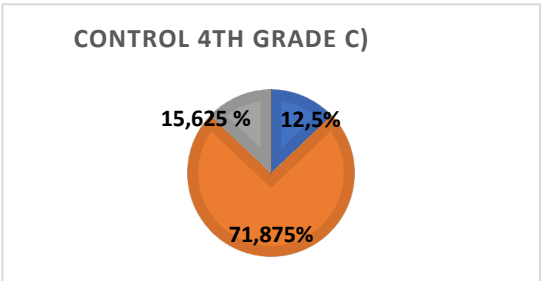


Whereas in 4th grade C the average student learning outcomes were 68.93 when viewed from the frequency of student learning outcomes, there were 7 students in the upper group (21.875%), 22 students in the middle group (68.75%), and 3 students. in the lower group (9.375%).

To prove the comparison, the "t" test is carried out based on the results of the "t" test that have been done, which is obtained tcount = 2,677 while ttable with df 64 at a significant level of 5%, namely 1.998 tcount > ttable (2,677 > 1,998) which means that the working hypothesis (Ha) in this study is accepted, that is, there is a difference between the use of the demonstration method without the demonstration method on learning outcomes class students 4th grade Public Elementery School 16 Bengkulu City (Satria & Kusumah, 2019). Furthermore, namely, the observation assessment in the control class and experimental class with the number of each object, namely 4th Grade D (experimental class) as many as 32 students and 4th grade C (Control Class) as many 32 students.



The average result obtained is in the experimental class of 61.40. When viewed from the frequency of the results, there are 5 students in the upper high group (15.625%), 19 students in the middle group (59.375%), and 8 students in the lower group (25%).



Whereas in 4th Grade C the average student questionnaire results were 51.56. When viewed from the frequency of student learning outcomes, there were 4 students in the upper group (12.5%), 23 students in the middle group (71.875%), and 4 students. in the lower group (15,625%).

To prove whether the achievement of the two groups is homogeneous or not, a variance (homogeneity) test is carried out. From the homogeneity test ("F" test), the results obtained Fcount <Ftable (1.06 <1.82), then the

variance of student activity data is homogeneous (the same), so it can be said that the abilities of the two classes are the same and can be used as research samples based on the normality test. (Usmadi, 2020).

To prove this comparison, the "t" test was carried out based on the results of the "t" test that had been done, obtained tcount = 3.828 while t table with df at a significant level of 5%, namely 1.998, thus tcount> ttable (3.828> 1.998) which means the hypothesis work (Ha) in this study is accepted, that is, there is a difference between the results of observations in the control class and in the experimental class. That means there is effect student activeness on mathematics learning outcomes fourth grade students public elementary school 16 City Bengkulu.

4. Discussion

The average result obtained is in the experimental class of 61.40. When viewed from the frequency of the results, there are 5 students in the upper high group (15.625%), 19 students in the middle group (59.375%), and 8 students in the lower group (25%).

The learning method in this study uses the demonstration method. This learning method can help teachers convey material more easily, and make students enjoy learning. The material that was previously difficult for students to understand becomes easy after this demonstration method is applied. This is evident from the score of mathematics learning outcomes after this method is applied. In addition, students' interest in learning increased based on random interviews with several students.

The learning material in this study was "Area and Circumference of Square and Rectangle" in 4th grade. The research subjects were 32 students in 4th grade D who were given treatment in the form of demonstration methods and 4th grade C as objects totaling 32 students who were not given learning treatment. demonstration method.

Before being given treatment, a pretest was given to determine the students' initial ability to the material being tested. In working on this pretest, students generally only worked on questions according to their makeshift abilities. This is because the material being tested (pretest) has not been taught. The achievements obtained by students in the form of the average pretest score for 4th grade D were 47.71 and 4th grade C was 46.25 then the upper, middle and lower categories were determined. When viewed from the pretest average of the two classes there is no significant difference (same). To prove whether the achievement of the two groups is homogeneous or not, a variance (homogeneity) test is carried out. From the homogeneity test ("F" test), the results obtained $F_{count} < F_{table}$ (1.17 <1.82), then the pretest data variance is homogeneous (same), so it can be said that the abilities of the two classes are the same and can be used as research samples based on the normality test.

Next is learning by using the demonstration method in 4th grade D. So that the posttest ability in 4th grade D is obtained using the demonstration method with an average of 75.81. When viewed from the frequency of the results, there were 8 students in the upper group (25%), 20 students in the middle group (62.5%), and 4 students in the lower group (12.5%). Whereas in class 4 C the average student learning outcomes were 68.93 when viewed from the frequency of student learning outcomes there were 7 students in the upper group (21.875%), 22 students in the middle group (68.75%), and 3 students in the group. below (9.375%).

To prove this comparison, the "t" test was carried out based on the results of the "t" test that had been done, obtained tcount = 2.677 while t table with df 64 at a significant level of 5%, namely 1.998, thus tcount> ttable (2.677> 1.998) which means The working hypothesis (Ha) in this study is accepted, that is, there is a difference between the use of the demonstration method and the non-demonstration method on the learning outcomes of 4th grade students of Publik Elementery School 16 Kota Bengkulu.

Next, namely, the observation assessment in the control class and the experimental class with the number of each object, namely 4th grade D (experimental class) as many as 32 students and 4th grade C (control class) as many as 32 students. The average result obtained is in the experimental class of 61.40. When viewed from the frequency

of the results, there are 5 students in the upper group (15.625%), 19 students in the middle group (59.375%), and 8 students in the lower group (25%).

Whereas in 4th grade C the average student questionnaire results were 51.56 when viewed from the frequency of student learning outcomes, there were 4 students in the high group (12.5%), 23 students in the middle group (71.875%), and 4 students. in the lower group (15.625%).

To prove whether the achievement of the two groups is homogeneous or not, a variance (homogeneity) test is carried out. From the homogeneity test ("F" test), the results obtained Fcount <F table (1.06 <1.82), so the variance of student activity data is homogeneous (same), so it can be said that the abilities of the two classes are the same and can be used as research samples based on the normality test.

To prove this comparison, the "t" test was carried out based on the results of the "t" test that had been carried out, obtained tcount = 3.828 while t table with df at the significant level of 5%, namely 1.998, thus tcount> ttable (3.828> 1.998) which means hypothesis work (Ha) in this study is accepted, that is, there is a difference between the results of observations in the control class and in the experimental class. That means there is an effect of student activeness on mathematics learning outcomes of 4th grade Public Elementery School 16 Bengkulu City.
All teachers would want optimal mathematics learning outcomes and overall scores have high scores. These high mathematics learning outcomes have been obtained in research conducted by De Witte, Haelermans and Rogge (2015); Chen, Yang and Hsiao (2016); Sari and Yunianta, (2017). In addition, the research variables used have an influence on learning outcomes. But even so there are studies that significantly influence demonstration learning methods but significantly linkages have weaknesses. This happened in a study conducted Thompson and Soyibo, (2002). This is very common in educational research, because there are often confounding variables that are not seen by research observers (Peters, 2015).

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