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RESEARCH ARTICLE

The Effect of Discovery Learning Model Using Sunflowers in Circles on Mathematics Learning Outcomes

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ABSTRACT

This study aims to describe the effect of discovery learning model using sunflowers in circles on mathematics learning outcomes of grade VIII Junior High School Number (SMPN) 1 Pagaralam. The methods used in this study is descriptive method quantitative pretest-posttest design with control group design. The population in this study is the entire class VIII students of Junior High School Number (SMPN) 1 Pagaralam that amounted to 270 students with samples at 60 students. Data collection was taken by way of documentation and test be reserved in the form of the essay. The test was analyzed by documentation photograph and statistician with compare data result class experiment and class control, with the significance level of 5%. The result found in the discovery learning approach using sunflowers give good effect the result of learning, this is average experiment class is better than with control class.

1. INTRODUCTION

The learning process in general is an activity that resulted in changes in behavior, then understanding of learning is an activity undertaken by the teacher in such a way so that student behavior changes to a better direction. To improve student learning outcomes required an educational tool or learning media. Application of learning model should be able to train ways to obtain new information, selecting so that there is an answer to a problem. Student learning outcomes can be improved if students' learning interest in the subject also increases (Setiawaty, 2018).

The circle is a collection of dots that form a closed arch where the points on the arch are equidistant to a particular point in the arch (Blackwell et al, 2001; Coombe, 2002; Nicol, 2002). The particular point in the arch is called the center of the circle and that distance is called the radius of the circle (Metha, 2014, p.20).

In everyday life, of course, there are many circles that we can find, ranging from trivial objects like donuts, where the CD player even to more complicated objects such as rolling coaster games. Therefore, the circle has many uses for example in measuring the diameter and area of the circle. Through these examples, we can understand that it is very important to know the principles of the circle. Starting from simple things like the circumference of the circle (πd) and the circle area formula (πr^2 to other more complex circle principles that will be studied at higher levels (Herbst, 2006).

Designing learning activities in the classroom to find the formula of the area circle, the teacher must have a guess or hypothesis and be able to consider students' reactions to each stage of the learning path towards the learning objectives being carried out (Mursalin et al, 2018). Teachers can select appropriate learning activities as a basis to stimulate students to think and act when constructing mathematical concepts.

There are still many students who have difficulty understanding the circumference and the formula of the circle area. If the student is asked how the circumference of the circles or circle area which radius or diameter are known, the student does not answer immediately. Some say forget the formula and something is wrong in using the formula. Moreover, if asked why the formula of the circumference of the circle and the formula of the circle area is $2\pi r$ (or πd) or πr^2 or ($1/4\ \pi d$), the student can not give the answer at all. Students' difficulties in understanding the material are thought to be the way teachers teach. The teacher is only fixated on the lecture method by writing formulas, giving examples of problems and assigning tasks. Students simply accept and memorize the circumference formula and the area of the circle. As a result, the knowledge obtained by students only temporarily survives because the knowledge is not constructed by the students themselves (Abdussakir & Achaiyah, 2009, p.6).

Many factors affect the success of students and things that often hinder the achievement of learning goals (Afandi, 2018; Herbst, 2003). Because basically, every child is not the same way of learning, so too in understanding abstract concepts. Student activity in the learning process in the classroom is still very less (Hidayati, 2017; Fonna, 2018a; Mursalin, 2014). In the curriculum of 2013 mathematics learning should be started with the introduction of the problem according to the situation (contextual problem). By posing contextual problems, learners are gradually guided to master mathematical concepts. One approach related to the real world is the use of context. Context is a specific situation or an environment

involving students. The context used should not be a real-world problem but can be in the form of games, use of props, or other situations as long as it is meaningful and imaginable in the minds of students.

Previous research (Rahayu, 2017, p.47) using the context of hurdle jumps can help students in learning especially in the field of mathematics studies. Sunflower is a flower that we often encounter in Indonesia, but the sunflower originally came from North America that is Mexico (Katja, 2012, p.234), because the flower is growing in a tropical climate it is not difficult to plant in Indonesia. This flower is also a lot of benefits for research as a source of food, medicines, and cosmetics (Suprapto & Supanjani, 2009, p.89), these flowers are circular and have different diameters, this is intended as a context and props in learning, in this case, one of the learning methods is expected to provide help in solving problems in an effort to improve student learning outcomes. A visual aid is something that can be a means of connecting to achieve the learning message. The props work to help and model something in the learning process (Arsyad, 2014; Amalia, 2018).

One of the learning models that provide opportunities for students to develop and find their own understanding, the information presented is easily absorbed, processed and stored well by the student memory system as well as provide opportunities for students to play the more active role in the classroom is a model discovery learning (Fonna, 2018b: Alfieri et al, 2011).

Discovery learning is a method of learning that emphasizes more on the discovery of previously unknown concept or principle (Rizta, 2016, p.15). Meanwhile, according to (Suprianto, 2014, p.19) Discovery Learning method is a teaching method that regulates teaching in such a way that children acquire knowledge that they have not previously known without direct notification, partially or wholly found alone. Discovery occurs when individuals are involved, especially in the use of their mental processes to discover some concepts and principles. Discovery is done through observation, classification, measurement, prediction, and determination. The point is that this learning emphasizes for students to be more active so that students can find themselves indirectly in the learning process activities (Lefrancois, 2000, p.209.

The discovery learning strategy in explaining broad circle material is best carried out in small study groups. But many are also carried out in larger study groups. While not all students may be involved in the discovery process, the discovery approach can benefit learners. This approach can be implemented in the form of one-way communication or two-way communication. Therefore, in this study using sunflower props to build motivation and attract the attention of students in learning a circle that can be searched through the context of sunflower so that affect student learning outcomes at the end of learning.

Based on the some of the description above, it is necessary to conduct study using discovery learning model using sunflower on the circles material at the Junior High School Number (SMPN) 1 Pagaralam to see the effect on learning outcomes.

2. METHODS

The type of this research is an experimental research method. The research design that will be used in this research is pretest-posttest control group design. In this design, there are two classes each chosen randomly (R). Then given a pretest to know the initial state is there a difference between the experimental group and the control group. A good pretest result when the experimental group score is not significantly different from the control group. In the data collection, the research conducted experimental research by teaching in the classes that become the sample that is the experimental class and the control class.This research was conducted from March 5 to May 10, 2017, at SMPN 1 Pagaralam academic year 2016/2017.

The population of this study is all students of class VIII, while the sample of this study is the class VIII.C as an experimental class of 32 students but there are 2 students who are absent so that only 30 students, then class VIII.E serve as control class 31 students and 1 student who was absent during the research process was implemented so that only 30 students. Here is a pretest-posttest control group design research table.

Table 1. Research design of pretest-posttest control group design

E	O_C	X	O_C
K	O_E		O_E

From the above design the researcher develops into a research model which can be seen in the following figure.

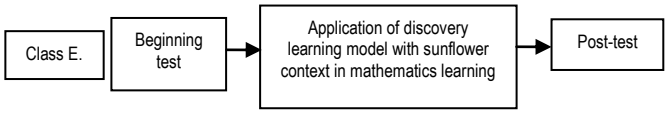

Figure 1. Design of Discovery Learning Models Using the Sunflowers

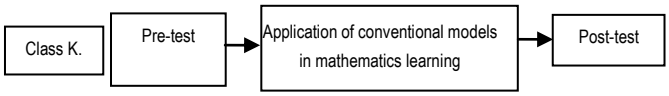

Figure 2. Design of Conventional Models in Mathematics Learning

Independent variable (Independent Variable) Discovery Learning Learning Model with sunflower context. Dependent Variable (Dependent Variable) is the result of learning mathematics class VIII SMP Negeri 1 Pagaralam academic year 2016/2017. The techniques used to collect data are the Test Instruments given before (Pretest) and after (Posttest) the learning process in the experimental class and the control class.

The instrument used to measure student's ability data is by giving the question of instrument test which amounts to 10 questions in essay form. Furthermore, the test instrument of first learning outcomes in validation, in the reliability test, calculate the level of difficulty and distinguishing power of the problem assisted by statistical program SPSS 22.

To collect data required in this study conducted direct application of the model of discovery learning with the sunflower context on the influence of learning outcomes students in the classroom. So that can be seen the influence of learning through the learning model.

The technique used to collect data in this research that is documentation and test. Then before the hypothesis tested first in the test of data normality and homogeneity. Furthermore, the test data is analyzed, to test the hypothesis of the researcher using t-test statistic with a significant level of 5% with the formula:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{s\sqrt{\frac{1}{n_1}+\frac{1}{n_2}}} \quad \text{, and } s^2 = \frac{(n_1-1)s_1{}^2+(n_2-1)s_2{}^2}{n_1+n_2-1}$$

(Sudjana, 2005, p.241)

3. RESULTS AND DISCUSSION

Based on the validation of the items from the 10 questions tested try everything valid or meet the criteria.

Table 2. Results of Problem Reality Questions

Cronbach's Alpha	N of Item
0,736	10

If the result $r_{xy} = 0{,}736$ consulted with the value of table t product moment with dk = n−1 = 30−1 = 29 significant 5% then obtained t_{tabel}= 0,367. Because $r_{xy} = 0{,}736 > t_{tabel}$ = 0,367 then all data analyzed using SPSS system is reliable.

Based on the results of testing the level of difficulty and distinguishing power of the item obtained results, all questions meet the criteria that have been adjusted with the validation results. The calculation of the level of difficulty criteria obtained 9 items of medium matter and 1 item is easy. And for the power dissection obtained criteria 2 items of good question, 7 items enough and 1 item about ugly.

Table 3. Normality Test Results Before and After Treatment Tabel

Class	Before	After
Exsperiment	6,92	6,818
Control	3,041	2,204

From the calculation result $\chi^2{}_{count}$ = 6,962 with n = 30 and dk = 6 - 3 =3 and α = 5% obtained $\chi^2{}_{table}$ = 7,81. Because $\chi^2{}_{count} < \chi^2{}_{table}$ or 6,962 < 7,81 then the test value data of the experimental class students is normally distributed. From the calculation result $\chi^2{}_{count}$ = 3,041 with n = 30 and dk = 6 - 3 = 3 and α = 5% obtained $\chi^2{}_{table}$ = 7,81. Because $\chi^2{}_{count} < \chi^2{}_{table}$ or 3,041 < 7,81 the test grade data of the control class students is normally distributed.

Table 4. Homogeneity Test

Description	Before	After
F_{count}	1,012	1,242

In table 4 at the time before the treatment of the distribution of F with $dk_1 = 29$ and $dk_2 = 29$ with a significant level of 5 % is $F_{29:29} = 1{,}861$. So from the calculation above, it can be concluded that $F_{count} < F_{table}$ or 1,012 < 1,861 so it has a homogeneous variance. After the treatment $F_{count} < F_{table}$ atau 1,242 < 1,861. so it has a homogeneous variance as well.

Table 5. Results of Post-test Students

Description	Score	
	Discovery Learning	Convensional
Average	85	78,63
Deviation Standard	6,48	5,82
Maximum Score	100	92
Minimum score	67	71
Theorytic Maximum Score	100	100
Theorytic Minimum Score	0	0

After the average and standard deviations from the test results of the students of the experimental class and control class are obtained, then the hypothesis test is performed. A list of average and standard deviations of the experiment class and control class can be seen below:

Table 6. Average and Standard deviations

Experiment Class	Control Class
n = 30	n = 30
$\bar{x}$ = 85	$\bar{x}$ = 78,63
s_1 = 6,48	s_2 =5,82

This study was conducted using two cycles. Application of learning discovery learning with the sunflower context to improve student learning outcomes of the wide circle in the class VIII SMP Negeri 1 Pagaralam run well, students are motivated and interested in following the lesson so that the student activity is quite conducive in the classroom. In learning the students learn in the form of groups, researchers divide the students into 5 groups. Each group consists of 6 students. The researcher then gives the LAS and asks the students to discuss and work together with their group members to solve the problems in the LAS. The next activity is a presentation that can train students to dare to appear in front of their friends in presenting the results of the discussion.

In the first learning, there are still some obstacles, this is because students are not familiar with the method of learning discovery learning with the sunflower context. Obstacles experienced by researchers when doing research are still many students who have difficulty and error when solving a wide circle problem, such as (1) At the beginning of learning is a bit crowded in finding the group, some even less agree with its members due to less familiar; (2) student activity in innovation, presentation and inquiring still low; (3) some students are less careful in answering the problem so that many errors occur; and (4) the teacher invites the students to present the results of their discussion but many of them are shy and afraid, this may be due to their habit of passive previous activities in learning.

Based on the results of the analysis of the test data above, obtained the result of the average grade of experimental $\bar{x}$=85 with the category of excellent learning results that use the learning model of Discovery Learning with the sunflower context. While the control class using the conventional method obtained an average value of $\bar{x}$=78,63 with good learning category. After viewed from the test results and got the average value then drawn experimental class that uses the learning model of discovery learning with sunflower context average value is greater than the average value of the control class.

Table 7. Summary of Hypothesis Test Results

Description	T_{count}	T_{table}
Hypotesis	2,894	1,462

Based on the calculation results are obtained $t = 2{,}894$ and $t_{table} = 1{,}462$ $(t_{\text{count}} > t_{table})$. So that the result of learning mathematics in the circle area using discovery learning model with sunflower context in class VIII SMP Negeri 1 Pagaralam have influenced or better than conventional learning model.

4. CONCLUSION

Based on the results of this study, it can be concluded that in general students who follow the learning using the model of Discovery Learning with the sunflower context showed better results in learning

mathematics when compared with students who learning conventionally. This is possible because learning using the Discovery Learning model with the sunflower context provides flexibility for students to find and express answers with the use of various open issues, because in solving the problem students are required to be more active in understanding, reviewing and transferring knowledge gained. The researcher also found that students are more active with learning discovery learning and coupled with the props that they did not expect that will learn the circle using sunflowers.

The results of this study also aligned with the research by Siregar & Marsigit (2015, p.6) and Hidayati (2016, p.85) study they found that discovery learning is effective against achievement and motivating students. The use of Discovery Learning model with the context of sunflower run well and contribute positively to the students 'learning outcomes in class VIII SMP Negeri 1 Pagaralam, which is seen from the analysis of test results obtained students' mathematics results in the experimental class is better than the control class.

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