JISAE
Online ISSN : 2597-8942
Print ISSN : 2442-4919
Journal of Indonesian Student Assessment and Evaluation

INFLUENCE OF DISCOVERY BASED LEARNING LEARNING MODEL WITH SCIENTIFIC APPROACHON LEARNING OUTCOMES

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ABSTRAK

This study aims to determine the comparison of mathematics learning outcomes of students in grade VIII SMP which is taught through Discovery based learning learning by using Scientific approach on Opportunity material. The type of this research is Experimental Research. The subject of this study is the students of class VIII SMP in the even semester of the academic year 2014/2015 which amounted to 40 people. The data collected consisted of data on student learning outcomes and student response data on the device and learning. Data were analyzed using descriptive analysis and inferential analysis. Descriptive research results data show the results of student learning taught by learning model Discovery based learning using scientific approach is in the high category with an average of 82.42 with a standard deviation of 6.09 from ideal score 100. Average value of the gain of 0.75 with a standard deviation of 0.06 from ideal score 1 is in the high category, and classical learning completeness of 87.5%, while student response is in the category tends to positive with an average of 3.29. Descriptively mastery of learning outcomes and student responses are different. Hypothesis testing of differences in learning outcomes was done with the help of SPSS 20 for significant learning outcomes with $\alpha = 0.05$ and for significant normalized gain values with $\alpha = 0.05$. So it can be concluded that there is an influence on student learning outcomes taught through discovery based learning learning model.

Keywords: Discovery based learning, Scientific, Learning Outcomes

The results of empirical observations in the field indicate that most school graduates are less able to adapt to changes and developments in science and technology, difficult to be retrained and less able to develop themselves. The findings seem to indicate that the lessons used by some teachers in the school have not been much touched upon or develop students' adaptation skills.

The use of the right model of learning can encourage the growth of student pleasure towards the lessons, foster and increase motivation in doing the tasks, making it easy for students to understand the lessons so as to enable the students to achieve better learning outcomes. Therefore, through the selection of appropriate learning models teachers can select or adjust the type of approach with the characteristics of the subject matter presented.

Appropriate learning model will give a big influence to the students to use their basic capabilities to solve problems in a logical, analytical and strategic way so as to hone students' ability to solve problems. In fact in the field, students often experience errors in solving math problems. According Soedjadi, et al (Risnawati 2011) said that the difficulty is the cause of the error.

Learning systems that are generally teacher-centered leads to a lack of student activity in learning math, students only expect information from teachers. most teachers in teaching still lack attention to the thinking ability of the students, or in other words not doing meaningful teaching, the methods used are less varied, and as a result the students' learning motivation becomes difficult to grow and the

learning patterns tend to memorize and mechanistic. Coupled with the use of learning approaches that tend to make passive students in the process of teaching and learning, which makes students feel bored so no longer interested to follow the lesson, even more math lessons related to abstract concepts, so that understanding requires a high reason . Given such conditions that occur in the field, then should a teacher in the process of teaching and learning need to use teaching models and approaches that can directly activate students in teaching and learning process provided by the teacher. Therefore one of the solutions that will provide resolve problems experienced by students is the accuracy in choosing a model of learning in accordance with the subject matter.

Abdillah (Aunurrahman, 2013) states that learning is a conscious effort undertaken by the individual in good behavior change through practice and experience concerning the cognitive, affective and psychomotor aspects to obtain a particular goal, which takes place in an active interaction with the environment, which resulted in a number of changes in knowledge, understanding, skills, values, and attitudes. Learning may also be regarded as an interaction between the human self and its environment, which may be personal, fact, concept, or theory. In this case, there is an intention that the process of ineraksi it is the process of internalization of something into the self-learning, and done actively, with all the five senses participate.Learning is a process of business by the individual consciously to obtain behavioral changes, either directly observable or not directly observable as the experience (practice) in its interaction with the environment. It can also be said that learning as a mental or psychic activity takes place in an active interaction with the environment and results in changes in knowledge and understanding, skills, and values and attitudes.

Sanjaya (Slameto, 2010) suggests that learning is a translation of instruction, which is assumed to make it easier for students to learn everything through a variety of media, such as printed materials, television programs, pictures, audio, etc. so it encourages change. The role of teachers in managing the learning process, from teachers as a source of learning to become a teacher as a facilitator in teaching and learning. Learning media is a means of learning that is used as an intermediary in the learning process to enhance effectiveness and efficiency in achieving learning objectives.

This, as expressed by Gagne (Jamil, 2014) which states that, instruction is a set of events that learn learners in such a way that learning is facilitated. Therefore, according to Gagne, chasing or theacing is part of the instruction, in which the teacher's role is more emphasized on how to design or arranged the various resources and facilities available to use or use the students in learning something.

Learning outcomes according to Gagne & briggs (Jamil, 2014) abilities possessed by students as a result of learning acts and can be observed according to student performance. In the world of education, there are various types of learning outcomes that have been suggested by experts, among others, Gagne (Rudol, 2005) suggests five types of learning outcomes, namely intellectual skill, cognitive straegy, verbal information, motor skills, and attitude.

Sardiman (Slameto, 2010) states by knowing the results of work, especially

if there is progress, will encourage students to study harder. The more aware that the graph of learning outcomes increases then there is a motivation in students to continue to learn, with a hope that the results continue to increase.

According to Uno (Aunurrahman, 2013) the purpose of learning is usually directed at one area of the taxonomy of learning. Bloom, et al. (1973) sort out the taxonomy of learning in three domains, the cognitive domain, the affective domain, and the psychomotor domain.

Prasetyo et al (Ridwan A.S, 2014: 45) argues that discovery learning is divided into two, namely free discovery and guided discovery. In practice, teacher-guided discovery is more likely to be found because with the instruction of the teacher the student will work more directed towards achieving the stated goal. In planning and preparing guided discovery activities involve hands-on and minds-on.

According to David et al. (Nasution S, 2010) provides guidance in planning and preparing guided discovery lessons such as:

1. Determining goals to be learned by students.
2. Choosing the method according to the activity of the invention.
3. Determine the data observation sheet for students.
4. Preparing tools and materials in full.
5. Determine carefully whether students will work individually or in groups of 2-5 students.
6. Attempt first the activities to be undertaken by the student to know the difficulties that may arise or the possibility for modification.

The criteria of a scientific approach according to Kemendikbud (2013) are:

1. Material-based learning on facts or phenomena that can be explained by certain logic or reasoning; not limited to the imagination, fantasy, legend or fairy tale alone.
2. Teacher's explanations, student responses, and teacher-student educational interactions are free from any immediate prejudice, subjective thinking, or reasoning that diverges from the logical thinking path.
3. Encourage and inspire students to think critically, analytically and appropriately in identifying, understanding, solving problems, and applying learning materials.
4. Encourage and inspire students to think hypothetically in seeing differences, similarities, and links to each other from learning materials.
5. Encourage and inspire students to understand, apply, and develop rational and objective thinking patterns in responding to learning materials.
6. Based on concepts, theories, and empirical facts that can be accounted for.
7. Learning objectives are formulated in a simple and clear, but interesting presentation system.

METHOD

The type of research used in this study is Quast Experimental Design. Using pseudo experiments because researchers want to manipulate variables by giving treatment by comparing the 2 classes. Furthermore, both classes are

evaluated to see the changes or improvements that occur to the results of learning mathematics after receiving the treatment of learning with discovery based learning model

Variables are the objects of research that became the focus of research. In this study variables include two variables, namely the dependent variable and the independent variable. The dependent variable consists of score of student response and test of student learning result while free variable is treatment that is consist of discovery based learning learning model by using scientificdan approach. The response of the students referred to in this study is the students' responses after the implementation of the learning model Discovery based learning and the learning model Problem based learning using the scientific approach. Learning outcomes are scores obtained through the test before and after implemented learning by using learning models Discovery based learning and learning model Problem Based Learning using scientific approach.

The research design used was pretest-postest control group design. The design of this study is a description or design to conduct a study with the variables to be tested for truth. Because not all external variables that can influence the course of the experiment can be controlled. Selection of this design taking into account that in the design of the research undertaken preceded by pretest before treatment is given. The design model is described as follows:

Tabel 1. Design Model *pretest-postest control group design*

	Kelas	Pree-test	Treatmen	Post-test
R	E_1	O_1	X_1	O3

Ket:

R : Random Sampling

E_1 : The experimental class that will be taught with Discovery based learning model using scientific approach

O_1: Early student ability before being taught with Discovery based learning model using scientific approach

X_1 : Treatment (applying learning model of Discovery based learning using scientific approach)

O_2: Student learning outcomes after being taught using Discovery based learning model using scientific approach

In this study, the data collection technique used is a questionnaire of student responses used to collect data about the responses to learning devices and learning processes that take place. Questionnaires are given after the learning process takes place. Data about learning outcomes obtained through the test of mathematics learning outcomes of students before and after the learning by using the model of learning in each class, where the test of student learning outcomes in terms of three aspects, namely; a) cognitive aspects, b) affective aspects, c) psychomotor aspects.

Student response data will be obtained from the questionnaire given to the student after the learning ends. The effectiveness of the student response aspects is

measured using positive response categories, somewhat positive, somewhat negative, and negative. The effectiveness criteria are determined by calculating each average score. The determination of responses response aspects category is determined based on the following criteria:

Tabel 2. Category of Student Response Aspects

No	Score Average	Category
1	1,0 – 1,4	Negative
2	1,5 – 2,4	Negative Tendency
3	2,5 – 3,4	Positive Tendency
4	3,5 – 4,0	Negative

(Ardin, 2012)

Types of student learning outcomes are further categorized quantitatively. According to Arikunto (2005), argued that the scale of five is a division of levels divided into five categories as follows:

Tabel 3. Interprestasi Kategori Nilai Hasil Belajar

Interval Nilai	**Kategori**
90,00 – 100,00	Very Low
80,00 – 89,99	Low
65,00 – 79,99	Medium
55,00 – 64,99	High
0,00 – 54,99	Very High

Gain is the difference between the pretest and posttest values. Gain shows improvement of students' mathematics learning outcomes after teacher learning. This is done to avoid the conclusions of bias research. The excessive use of learning in improving student learning outcomes is reviewed based on the normalized gain value comparison, which can be calculated by the equation (Redhana, 2010):

$$g = \frac{nilaiposttest - nilaipretest}{nilaimaksimal(ideal) - nilaipretest}$$

The normalized low gain (N-gain) can be classified as follows:
:

Tabel 4. Pengkategorian Nilai Gain

Interval Nilai gain (g)	Kategori
$g \geq 0,7$	Tinggi
$0,3 \leq g < 0,7$	Sedang
$g < 0,3$	Rendah

Redhana (2010)

RESULTS

1. Student Learning Results

1.1. Description of student learning outcomes before applying the learning model of Discovery based learning using scientific approach

Student learning result data obtained by using result learning test of opportunity material. This test is given prior to applying the learning model of Discovery based learning and Problem Based Learning model using scientific approach.

Descriptive analysis of scores of students' mathematics learning outcomes before the application of learning models Discovery based learning and learning model Problem based learning using a scientific approach can be seen from the following table:

Tabel 5. Statistic Score Student Learning Mathematics Results Before Implementation Learning model Discovery based learning

Statistic	Statistic Result Model *Discovery based learning*
Sampel	40
Skor Ideal	100
Skor Maximum	47
Skor Minimum	10
Skor rata-rata	30,45
Rentang Skor	37
Deviasi standar	9,30

If the result of learning mathematics students are grouped into 5 categories then obtained the frequency distribution and percentage as follows:

Tabel 6. Distribusi Frekuensi Dan Persentasi Skor Hasil Belajar Siswa SMP Negeri 5 Pallangga Sebelum Penerapan Model pembelajaran *Discovery based learning*

Score	Category	Model *Discovery based learning*	
		Frekuensi	Persentase
0– 54	Very Low	40	100%
55 – 64	Low	0	0%
65 – 79	Medium	0	0%
80 – 89	High	0	0%
90 – 100	Very High	0	0%

Based on Table 5 and Table 6, it can be stated that the average score of mathematics learning outcomes of students before the application of discovery based learning model using a scientific approach of 30.45 with a standard deviation of 9.30 from ideal score 100 is in very low category, and from 40 students who

became the subject of the study obtained the score of learning outcomes in very low category.

1.2. Description of student learning outcomes after applying the learning model of Discovery based learning using a scientific approach

Student learning result data obtained by using result learning test of opportunity material. This test is given after applying the learning model of Discovery based learning using scientific approach. Descriptive analysis of the results of learning mathematics siswasetelah application of learning model Discovery based learning and by using a scientific approach can be seen from the following table:

Tabel 7. Statistic Score Student Learning Mathematics After Implementation Learning model Discovery based learning using scientific approach

Statistic	Statistic Result Model *Discovery based learning*
Sampel	40
Skor Ideal	100
Skor Maximum	94
Skor Minimum	71
Skor rata-rata	82,42
Rentang Skor	23
Deviasi standar	6,09

If the result of learning mathematics students are grouped into 5 categories then obtained the frequency distribution and percentage as follows:

Tabel 8. Frequency Distribution and Percentage of Student Learning Outcomes After the Implementation of Discovery Based Learning learning model using Scientific approach

Score	Category	Model *Discovery based learning*	
		Frekuensi	Persentase
0– 54	Very Low	0	0%
55 – 64	Low	0	0%
65 – 79	Medium	16	40%
80 – 89	High	20	50%
90 – 100	Very High	4	10%

Based on Table 7 and Table 8, it can be stated that the average score of students' mathematics learning outcomes after the application of discovery based learning model using a scientific approach of 82.42 with standard deviation of 6.09

from ideal score 100 is in high category. The students of 40 students who were the subjects of the study obtained an average score of learning outcomes in high categories.

1.3. Improved Pretest Value to Postest Student.

Based on pretest and posttest data related to learning result then further analysis of value of gain to the normalized gain of student. The results of the analysis of the normalized gain of students before and after applying the learning model Discovery based learning and learning model Problem Based Learning by using a scientific approach is as follows:

Tabel 9. Descriptive Statistics Improving Pretest Value to Postest Student Results

Statistic	Statistic Result Model *Discovery based learning*
Sampel	40
Skor Ideal	1
Skor Maximum	0,89
Skor Minimum	0,65
Skor rata-rata	0,75
Rentang Skor	0,24
Deviasi standar	0,06

If the standardized gain mathematics students are grouped into 3 categories then the frequency distribution and percentage as follows:

Tabel10. Frequency Distribution And Percentage Of Score Of Student Learning Outcomes

Score	Category	Model *Discovery based learning*	
		Frekuensi	Persentase
$g \geq 0,7$	High	32	80%
$0,3 \leq g < 0,7$	Medium	8	20%
$g < 0,3$	Low	0	0%

Based on Table 9 and Table 10, it can be stated that the average score of students normalized mathematical gain after the application of discovery based learning model using a scientific approach of 0.75 with a standard deviation of 0.06 from ideal score 1 is in the high category, and from 40 students who become the subject of research get the score of learning outcomes in high category.

1.4. Completion of Learning Outcomes

Based on the minimum criterion of validity (KKM) which is valid that is 74,9, hence level of achievement of result of learning mathematics classically with study discovery based learning model by using scientific approach can seen in

following table.

Tabel 11. Finality Distribution Student learning outcomes after the application of discovery based learning learning model by using a scientific approach

	KKM	Percentage of Classical Exhaustiveness (%)	
		Completed	Not Completed
Discovery based learning	74,9	87,5	12,5

Table 11 above shows that the percentage of mastery of students' learning outcomes after the application of discovery based learning model using a scientific approach of 87.5%> 74.9% (classical completeness).

1.5. Student Response

Student responses during application of learning model Discovery based learning and learning model Problem based learning using scientific approach is presented in the following table:

Tabel 12. Category of responses aspects of students

Treatment	Scores Average	Category
Model *Discovery based learning*	3,29	Positive Tendency

Based on the above table, it can be concluded that the student response to the learning model of Discovery based learning by using a scientific approach is likely to be positive. Thus the descriptive criteria of effectiveness are met.

2. Inferential Analysis

2.1. Hypothesis Testing Response students who are taught discovery based learning using a scientific approach

The mean test of the students' responses was taught discovery based learning using a scientific approach done by one sample t test using SPSS 20 for windows. Based on the results of the analysis obtained value p. <0.001 with the value of $\alpha = 0.05$ so that the value of $p < \alpha$. Thus H0, this means the average response score that is taught by the learning model of Discovery based learning using a scientific approach of more than 2.49.

2.2. *Hypothesis Testing The learning outcomes (posttes) students are taught discovery based learning by using a scientific approach*

Based on the results of the analysis obtained value p. <0.001 with the value of $\alpha = 0.05$ so that the value of $p < \alpha$. Thus H0 is rejected, this means the average of

learning outcomes (posttes) of students who are taught with learning model Discovery based learning using a scientific approach greater than 74.9.

2.3. *Hypothesis Testing Gain normalized students who were taught discovery based learning using a scientific approach*

Based on the results of the analysis obtained value p. <0.001 with the value of $\alpha = 0.05$ so that the value of $p < \alpha$. Thus H0 is rejected, this means the average gain of a normalized student taught by Discovery based learning model learning by using a scientific approach greater than 0.29.

2.4. Discussion of student responses taught by discovery based learning using scientific approach

The results of this study showed that responses were taught by the learning model of Discovery based learning by using scientific approach in the category tended to be positive with the average score of student responses reached 3.29. Learning through the learning model of Discovery based learning using a scientific approach, students can be more eager to learn math.

2.5. Discussion of learning outcomes (posttes) students are taught discovery based learning by using a scientific approach

The result of this research shows that the average of learning result (posttes) of students who taught by learning model of Discovery based learning by using scientific approach from student ability level is in high category that is 82,42 where 40% student is in medium category, 50% students are in the high category, and 10% of students are in very high category. This shows the learning model of Discovery based learning using scientific approach can improve students' ability in understanding the material Opportunities.

2.6. The discussion of students' normalized gain is taught discovery based learning using a scientific approach

The results of this study showed that the standardized gain of the students was taught by the learning model of Discovery based learning by using a scientific approach in terms of students' ability is in the categorical height of 0.75 where 20% of students are in the medium category and 80% of students are in the high category. This shows the learning model of Discovery based learning by using a scientific approach to improve students' ability in understanding the material of Opportunity.

CONCLUTION

Based on the results of research and discussion, the conclusions in this study are (1) learning outcomes (posttes) students who are taught with learning model Discovery based learning by using scientific approach in students of grade VIII SMPNegeri 5 Pallangga is in high category with an average of 82 , 42 with standard deviation of 6,09 from ideal score 100. Average value of gain equal to 0,75 with standard deviation of 0,06 from ideal score 1 is in high category, and classical learning result completeness equal to 87,5%. While the response of

students who taught with learning model of Discovery based learning by using scientific approach is in the categories tend to be positive with an average of 3.29 and (2) There are differences in learning outcomes and student responses taught by learning model Discovery based learning using the approach scientific students in grade VIII SMP.

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