



The Influence of Utilisation the Contextual-Learning Materials in Discovery Learning Models on Physics Learning Outcomes

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ABSTRACT

This research was motivated by the low of students learning outcomes in grade X at SMAN 1 Enam Lingkung that students think physics is difficult. Based on this problem, the aim of this research is to determine the effect of using contextual-based learning materials in the discovery learning model on the physics learning outcomes of student in grade X at SMAN 1 Enam Lingkung. This is experimental quantitative research with population of 180 students with 68 students was chosen as the sample 68 by using purposive random sampling technique. Analysis of the similarity of means was used to test the hypothesis because the data is normally distributed and has a homogeneous variance. The results of the cognitive domain analysis obtained that the average of the experimental class was 72.12 and the control class was 62.29. It can be concluded that the class that use contextual-based learning materials shows higher average learning outcomes compared to that of the class without contextual-based learning materials. Analysis of mean similarity test was obtained $t_h = 2.05$ while $t_t = 1.998$ at the 0.05 level of significance and $dk = 66$. It can be seen that t_h is in the H_0 rejection area, this means that H_0 is rejected and H_1 was accepted. Based on this result it can be concluded that there is a significant influence of the use of contextual-based learning materials with discovery learning model on physics learning outcomes of student in grade X in SMAN 1 Enam Lingkung.

Keywords: contextual learning, discovery learning, learning outcomes



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I. INTRODUCTION

Education has an important role in advancing the nation with build the human resource trough improvement of the behavior and character of new generation into become a mature humans and able to live independently in society [1]. Learning is also defined as the transformation process of students who did not know into a knowledgeable student [2]. An important topic to build strong future of a nation is science, that study the phenomenon of nature and apply it into a better way. Physics is a part of science that was developed through an inductive approach and has made many contributions to the development of science and technology. Physics concept also can be analyzed from daily experience and natural phenomenon that directly happen in the environment. Daily phenomenon-based physics learning is built through the process of investigating, compiling and testing the ideas [3]. The process of investigating, compiling and testing are the effort to master physics and to achieve learning goals, so that students of high quality and morals are produced.

Various learning methods are applied by teachers during the learning process. In other words, a learning model is a wrapper or frame for the application of a learning method, strategy and technique. There are several learning models that can be used in the teaching process, including the discovery learning model. Discovery learning is a process of finding something new in teaching and learning activities, where some or all of the knowledge is discovered by students themselves [4]. In this discovery learning, students can discover new concepts independently if the teacher has prepared the material to be presented first. With this model, students encourage to be actively participate in the learning process [5] and students will be able to develop their creativity [6]. Furthermore, students can discover for themselves various things that are important in learning [7]. Discovery learning is based on contextual problems. The discovery learning includes information,

transformation, and evaluation processes. We can understand that the discovery learning model is a teaching process that focuses on students' activities in learning. In the learning process using this method, the teacher only acts as a guide and facilitator [8]. In the discovery learning model, of course there are also learning methods used.

A learning model is a conceptual framework used as a guide in conducting learning that is arranged systematically to achieve goals which are techniques, strategies, methods and teaching materials [9]. Learning methods make it easier for teachers to carry out the learning process directly [10]. Learning methods are also useful for students in achieving learning goals [11]. Learning methods are procedures, sequences, steps and methods used by teachers to achieve learning goals. There are several learning methods such as lectures, questions and answers, discussions, experiments, demonstrations, field trips and so on. And also, during the learning process, teaching materials are usually used as a reference for the material to be studied. Teaching materials are facilities or tools that contain learning materials, methods, limitations and ways of evaluating that are designed systematically and interestingly to achieve the learning objectives, competencies or sub-competencies with all their complexity [12]. Teaching materials are designed to help learning related to current topics. There are many teaching materials that can be used, one of which is contextual-based learning materials.

Contextual learning relate material with events that occur in life. Students are directly involved in discovering the basic concepts of the material being studied and connecting them with real life [3]. Contextual learning encourages students to make connections between the knowledge they have and its application in their lives as family and community members [13]. Contextual learning is a learning approach that connects material with real life. This can make it easier for students to understand materials according to real conditions in the environment [14]. Contextual learning also has a positive influence on increasing students' problems solving abilities [15]. With contextual learning, students become more creative because they are required to independently analyze every event and fact presented with guidance from the teacher, until finally students can find and understand the concept of the material correctly [16] Contextual learning influences students' ability to understand material concepts well compared to students who learn using conventional learning models [17]. With the facts and data that have been presented, contextual learning can be an alternative to reduce theoretical and verbal learning method and switch to creative learning that involves students more in the learning process [18].

Based on the results of observations at SMAN 1 Enam Lingkungan, most students do not understand how to apply physics concepts in life. Students consider physics lessons to be difficult and feared and have no connection with life. As a result, students' physics learning outcomes are relatively low. This can be seen from the daily exam results in table 1,

Table 1. The Average of daily test scores

No	Class	KKM	number of students	Score
1.	X MIPA 1	76	36	77
2.	X MIPA 2	76	36	60
3.	X MIPA 3	76	36	43
4.	X MIPA 4	76	36	44
5	X MIPA 5	76	36	61

(Source: Physics teacher Class X SMAN 1 Enam Lingkungan)

Based on observations at SMAN 1 Enam Lingkungan, in the physics learning process, Teacher used books provided by the school as a learning materials. Learning is passive and there is little role for students. So by using contextual teaching materials in the discovery learning model, students are expected to be able to understand the material. Contextual learning is also a solution to increase understanding of the application of physics in life and students become more active in participating in the learning process. Contextual learning has an influence on the ability to solve mathematical problems well [15]. Based on the problem, this research was

entitled "The Effect of Utilisation the Contextual Learning Materials in the Discovery Learning Model on Physics Learning Outcomes at SMAN1 Enam Lingkungan"

II. METHOD

Research method is scientific steps to find the data with specific purposes [19]. This research is experimental research with a posttest control group research design. Sample is a part from population [20]. In this research, two classes were chosen randomly as sample and the population was 5 classes with 180 students. The sample class consists of experiment and the control class with the design in Table.2.

Table 2. Experimental Design

Class	Treatment	Post test
Eksperiment	X	O ₁
Kontrol	-	O ₂

Desc :

O₁ : Post-test experiment class

O₂ : Post-test control class

X : discovery learning model with contextual teaching materials

The data collection uses purposive sampling. Researchers chose samples based on certain objectives based on the same teachers, the same number of students, having almost the average scores and the same number of lesson hours. Variables consist of independent and dependent. The independent variable is the use of contextual teaching materials in the discovery learning model and the dependent variable is the results of learning physics in class X "impulse and momentum material" at SMAN 1 Enam Lingkungan.

The research consisted of three stages. First is the preparation stage, the second is the implementation stage, and the final stage. The preparation stage includes 1). determining the experimental and control classes, 2). determining the research schedule, 3). reviewing the physics lesson material for class experimental and class control, 6). prepare the instruments to be used (essay test), 7). Conduct trials in different classes but have almost the same potential students. The implementation stage is to provide different actions to the two sample classes. in the experimental class by providing contextual-based teaching materials to students and for the control class, students only used konvensional teaching materials. The final stage includes giving the test. At the end, students are tested with a number of tests to see the results of the student's learning outcomes. The test was given to the control and experimental classes. The research instrument consists of 1). teaching material evaluation sheet for material experts, 2). teaching material evaluation sheet for media experts, 3). instrument to measure the practicality of teaching materials, 4). instruments to measure the effectiveness of teaching materials, and 5). posttest. Data collection techniques use questionnaires and tests [21].

Data collection technique is the way to get the data in reseach [22]. In this research, used Data questionnaire and essay test. The questionnaire consists of open and close questionnaire [23] and essay test was used to find out the student ability in cognitive domain. After all of the data was obtained, we do the hypothesis test using the means similarity test (t test). However, it is necessary to calculate the normality tests and homogeneity tests before, using the following formula (1) and (2);

$$\text{Normality test, } Z_i = \frac{X_i - X_r}{S} \quad (1)$$

Description : X_i = student score

X_r = average score of students

S = varians

$$\text{Homogeneity test } F = \frac{S_i^2}{S_2^2} \quad (2)$$

Description : F = varian data

$$S_i^2 = \text{maximum varians}$$

$$S_2^2 = \text{minimum varians}$$

After the normality and homogeneity test was conducted, the equality test two averages (t test) is also carried out using formula (3) and (4) [24],

$$t = \frac{\overline{X}_1 - \overline{X}_2}{S \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}} \quad (3)$$

$$\text{With: } S = \frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2} \quad (4)$$

\overline{X}_1 = the average score of experiment class

\overline{X}_2 = the average score of control class

s_1 = Varian of experimen class

s_2 = Varian of control class

S = varians

n_1 = number of student in experiment class

n_2 = number of student in control class

The calculated t_h is compared with the t_t contained in the t distribution table. The required hypothesis testing criteria is to accept H_0 , if $(-t_{1-1/2\alpha} < t < t_{1-1/2\alpha})$, with $dk = n_1 + n_2 - 2$ and probability $(1-1/2\alpha)$. For other prices, H_0 is rejected.

III. RESULTS AND DISCUSSION

Student learning outcomes during the learning process are in the cognitive domain, which are obtained based on research that has been conducted in control and experimental classes. Learning outcomes were obtained after giving the final test in the form of an essay test which was taken by 33 students from the experimental class and 35 students from the control class. From the research, it was found that the learning outcomes of students in the experimental class were higher than the control class. This can be seen from the average score of experimental class which is higher than the control class. Data analysis was calculated sequentially including normality test, homogeneity test, and hypothesis test.

The normality test was carried out using Microsoft Excel 2007 to get the L_0 and L_t values at a real level of 0.05 as shown in table 3 below:

Table 3. Normality Test of Experiment and Control Class

Class	N	L_0	L_t	Description
Control	35	0.141	0,154	Normal
Experiment	33	0.084	0,154	Normal

Based on Table 3, it can be seen that two sample classes have $L_0 < L_t$. It can be concluded that the final test result for the two sample classes is normally distributed.

The homogeneity test was carried out to find whether the two samples had a homogeneous distribution. The homogeneity test was conducted using Microsoft Excel 2007 with the F test to obtain homogeneity. The results for two classes can shown in table 4 below:

Table 4. Homogeneity Test of Experiment and Control Class

Class	N	\bar{X}	S^2	F_{table}	F_{count}
Control	35	62.29	476,974	1.793	1.597
Experiment	33	72.12	298.484	1.793	1.597

Table 4 shows $F_{count} < F_{table}$, so both classes have homogeneous variance.

After carrying out the normality test and homogeneity test, both classes have normally distributed and had homogeneous variance, as a condition for testing the equality of two means (t test).

Table 5. Mean Similarity test (t test) of Experiment and Control Class

Class	N	\bar{X}	S^2	t_{table}	t_{count}
Control	35	62.29	476,974	1,996	2,014
Experiment	33	72.12	298.484		

Based on Table 5, hypothesis test was carried out using the t test. The results of the t test obtained $t_{count} = 2.051$, while the t_{table} at the real level of 0.05 and $dk = 66$ obtained $t(0.975) = 1.998$. Based on the hypothesis testing criteria, H_0 is accepted if $t_{count} > t_{table}$. The calculated value obtained is in the H_0 acceptance area so that H_0 is rejected and H_1 is accepted.

Based on the analyzed data, it was found that physics learning outcomes using contextual-based teaching materials have a significant difference with physics learning outcomes in conventional material with the discovery learning model. It can be seen from the average score of students before the research, 60,00 for the control class and 61,00 for the experimental class and after the research, it was 62.28 for the control class and 72.12 for the experimental class. Physics learning outcomes that use contextual-based teaching materials is higher than the control class which uses conventional material in discovery learning model. As we know that discovery learning model is one of the good models for the students in learning process. That's because students directly involve in the process of discovery newthing or new concept in physics. Moreover the knowledge was closely related with events in student's daily live. So the student start to think that physics is easy and intersting to studied. The physics concept that was founded by themselfe (students) will be easy to save in their memory [25] in longer time.

The hypothesis test show that H_0 is rejected. This shows that the use of contextual-based teaching materials in the discovery learning model has a significant influence on physics results. The high learning outcomes of students in the experimental class are caused by students understanding physics concepts in life directly. Using contextual-based physics learning materials in the discovery learning model helps students understand the material so that students can learn independently by understanding real applications in life. Based on observations during the learning process using contextual-based teaching materials in the discovery learning model, students can discover for themselves physics concepts or knowledge learned through teaching materials. The more important thing is students who have lower basic cognitive abilities are more enthusiastic about contextual learning material.. So, the utilisation of contextual learning material in descovery learning model can help the learning process very well.

IV. CONCLUSION

Based on the results of data analysis and discussion, the average score for physics learning outcomes for students who use contextual-based teaching materials in the discovery learning model is 72.12 and the physics learning outcomes for students who do not use contextual-based teaching materials are 62.29. Analysis of the

mean similarity test obtained $t_{count} = 2.05$ while $t_{table} = 1.998$ at a real level of 0.05 and $dk = 66$. So it can be seen that t_{count} is in the H_0 rejection area, this means that H_0 is rejected and H_1 is accepted, so it can be concluded that "There is a significant influence of the utilisation of contextual learning materials in the discovery learning model on physics learning outcomes at SMAN 1 Enam Lingsung."

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