Utilizing POE (*Predict-Observe-Explain*) Learning Model to Enhance Students' Learning Outcome in Science

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Abstract: This study aims to determine enhanching students' science learning outcomes before and after applying the POE (predict-observe-explain) learning model. This type of research is a pre-experimental type one-group pretest-posttest design, which is an experiment carried out on only one group, without comparison. This research was conducted in 4 of 38 students. Based on the results of the study, it was found that the average score of learning outcomes before treatment (pretest) was 57.89 while the average score of learning outcomes after treatment (posttest) was 80.63 and the average value of gain was 0.56 which included medium interpretation, and the results of hypothesis testing using t-test with t count = 12.92 and t table = 2.0374 then concluded tcount> t table, then reject H0 means significant. This means that there is an increase in grade IV learning outcomes for students between before (pretest) and after (posttest) applying the POE (predict-observe-explain) learning model. This shows that the POE (predict-observe-explain) learning model can improve the learning outcomes of elementary school students in natural resource material.

Keyword: POE learning model, learning outcome science.

1. Introduction

Education always experiences change, development and improvement in accordance with developments in all areas of life. Changes and improvements in the field of education include various components involved, including the implementers of education in the field (teacher competency and quality of educators), quality of education, curriculum tools, educational facilities and infrastructure and quality of education management including changes in methods, strategies, and learning model.

The learning model is a pattern that has been carefully planned and is a guideline for the implementation of learning starting from the opening, core and closing activities and assessment of learning arranged in such a way as to achieve the learning objectives (both main objectives and companion goals / nurturant effects) (Suprihatiningrum, Jamil , 2016: 185-186). Learning models are closely related to learning outcomes.

The learning process that lacks motivation for students will affect student learning outcomes. Based on the observations, it was found that the learning outcomes of science were still low in four grade. The low learning outcomes of science in four class are caused by several things such as: (1) teachers who are still using conventional teaching methods (2) the learning process still tends to memorize theory and students experience less what they are learning, (3) general

science learning. There are concepts that require observation, students have not been given the freedom to make direct observations, (4) during ongoing learning students are less active in answering questions about the material being studied, seen when the teacher questions students more silently, and (5) students still many imitated answers because there were still many of them who lack understanding of the material described by the teacher

Learning that involves someone directly can be applied to science subjects. Natural Sciences is one of the main subjects in the Indonesian education curriculum. Science is taught from elementary school to college level. That is because of the importance of the development of Natural Sciences. This was stated by Trianto (in Kadek, et al., 2016: 2) that Natural Sciences is one of the sciences that plays an important role in the development and advancement of Knowledge and Technology. Science is the meaning of nature and various phenomenon/ behavior/ characteristics that are package into a set of theories and concept through a series of scientific processes carried out by humans (Hermita, N, *et al.,* in Lazim N, 2018:11). Learning science is not only limited to the delivery of material, but also requires learning activities that involve students directly through experiment or observation activities that utilize the surrounding environment.

One learning model that is applied so that students can be actively involved and gain direct learning experience in science learning activities is the Predict Observe Explain (POE) model. The model POE (predict-observe-explain) is one of the learning models used in learning activities, helping students shape their knowledge first through the senses. This learning activity includes seeing, listening, touching, smelling, and feeling about a problem, namely making predictions (prediction), making observations, and making explanations (Suparno in Chandra, Hafridza, et al., 2014: 16) .This is reinforced by research conducted by Kala, et al (2013) which shows the results that POE can improve students' understanding so that student learning outcomes also increase.

2. Method

The method used in research in grade 4 elementary school is pre-experiment one group pretest-posttest design. consists of one group there is no control group. Pretest is given before the learning process in this study begins, while post-test after the whole learning process is complete (Fendrik, Muhammad, 2018:98). While the research process is carried out in three stages, namely 1) conducting a pretest to measure the initial condition of the respondent before being given treatment; 2) giving treatment; and 3) doing a posttest to determine the state of the dependent variable has been given treatment.

3. Result and Discussion

The results of the research obtained consisted of scores of science learning outcomes and activity sheets. Score of science learning outcomes in the form of initial tests (pretest), final test (posttest), and improvement in learning outcomes, while the activity sheet in the form of teacher activity sheets and student activity sheets in learning.
Obtaining the average initial test score, final test, minimum value, maximum value, and normalized gain can be seen in table 1.

Table 1 learning outcome description

Test	Number of student (n)	Avarage score ($\overline{xx}$)	Minimal score	Maximal score	N-Gain
Pretest	38	57,89	32	88	0,56
Posttest	38	80,63	52	96	

The table above shows that there are differences in the average initial test scores (pretest) and final test (posttest). The average science learning outcomes in the initial test (pretest) was 57.89, while the average science learning outcomes in the final test (posttest) was 80.63. The average science learning outcomes of students after receiving treatment using the POE (predict-observe-explain) learning model has increased. Gain of science learning outcomes for four grade students obtained at 0.56 including medium interpretation.

To analyze the difference between pretest and posttest scores on science learning outcomes using pretest and posttest one group design, the comparative hypothesis testing was done with t-test. Before the t test is carried out, the normality test and homogeneity test are first carried out.

1) Normality test
This data normality test is carried out using the Kolmogorov-Smirnov test. Normality test is used to determine the normality of the initial test score data and the final score data. with the formulation of the following hypothesis:
H_0 : normal distribussion
H_1 : normal not distribussion
with testing criteria:
refusing H_0 if $a_{max} > D_{table}$ and
accepting H_0 jika $a_{max} \leq D_{table}$

Hypothesis testing uses a significant level $\alpha = 0.05$ and $D_{table} = 0.2206$ (seen in D for the Kolmogorov-Smirnov test for a_{max} single sample) with criteria if the H_0 is accepted and concluded that the data is normally distributed.
The results of the calculation of the normality test for the initial test (pretest) and final test (posttest) can be seen in table 2 below:

Tabel 2 Results of Pretest Normality Test and Posttest of Science Learning Outcomes

Test	Normality			Description
	N	a_{maks}	D_{tabel}	
Pretest	38	0,0587	0,2206	Normal
Posttest	38	0,1588	0,2206	Normal

Based on table 2 it can be seen that the initial score pretest is a_{maks}= 0.0587 and $D_{tabel} = 0.2206$ $a_{maks} < D_{tabel}$ so that it is normally distributed. Final test score (posttest) is $a_{maks} = 0.1588$ and $D_{tabel} = 0.2206$ $a_{maks} < D_{tabel}$ it is normally distributed.

Before testing the hypothesis by using the t test to determine whether there is an increase in science learning outcomes between pretest and posttest, it is necessary to first test the normality test of N-Gain data acquisition. As for the N-Gain, the experimental class learning outcomes

with an average of 0.56 in the medium category. To see whether the acquisition of N-Gain learning outcomes of Natural Sciences is normally distributed or cannot be seen in the following table 3

Tabel 3 N-Gain Normality Test of Results Science Learning Results

Data	Normality			Description
	N	a_{maks}	D_{tabel}	
N-Gain	38	0.0051	0.2206	Normal

Berdasarkan tabel 3 dapat diketahui bahwa a_{max}= 0.0051 sedangkan D_{tabel} = 0.2206 maka a_{maks} a_{maks}<$D_{tabel}$$D_{tabel}$ sehingga data N-Gain berdistribusi normal.

Based on table 3 it can be seen that a_{max}= 0.0051 while D_{tabel} = 0.2206 $a_{maks}$$a_{maks}$<$D_{tabel}$$D_{tabel}$ that the N-Gain data is normally distributed

2)   Homogenity test
Based on the normality test, it is known that the initial test, final test, and N-Gain are normally distributed, then homogeneity tests can be carried out. The formulation of the homogeneity testing hypothesis is as follows:
H_o : varians homogen (v_1=v_2)
H_a : varians not homogen (v_1≠v_2)
Hypothesis testing uses a significant level α = 0.05. Because F_{count} = 1.89 dan F_{table} = 1.91 so F_{count}< F_{table} in order that H_o accepting varians homogen.

3) T test
Based on the normality test on the initial score (pretest) and the final test score (posttest) it was found that students' learning outcomes were normally distributed. Furthermore, t test is conducted to determine whether or not there is a significant difference between the initial average score (pretest) and the final average score (posttest). To analyze the difference between pretest and posttest scores on science learning outcomes using pretest and posttest one group design, with the following hypothesis:
Refusing H_0 if t_{count}> t_{table} and
Accepting H_0 if t_{count}> t_{table}
Description :

Refusing H_0	:	There was an increase in the learning outcomes of the fourth grade students elementary school which was significant between the results before (pretest) and the results after (posttest) applying the POE learning model (predict-observe-explain)
Terima H_0	:	There was no significant increase in the science learning outcomes of the fourth grade students of elementary school between the results before (pretest) and the results after (posttest) applying the POE learning model (predict-observe-explain)

Then to test the hypothesis, then the t-value (thitung) is compared with the t-value (t table). The method of determining the value of t table is based on a certain significant level (α = 0.05) and dk = n-1 so dk = 38 -1 = 37, then the table is seen in the distribution table t with dk = 37, then table = 2.0374. The results of the t test on the pretest and posttest scores can be seen in the following table 4:

Table 4 t test score of *Pretest* and *Posttest*

N	M_d	Σxd^2	t_{table}	t_{count}	Hipotesis	Judgment
38	22,74	4355,37	2,0374	12,92	Tolak H_0	Significant

Based on table 4 it can be seen that t count = 12.92 and t table = 2.0374 then t_{hitung} is compared with t table then it is concluded that $t_{count} > t_{table}$, then reject H_0 means significant. This means that there is a significant increase in the learning outcomes of science in four grade between the results before (pretest) and the results after (posttest) to apply the POE (predict-observe-explain) learning model.

In addition, teacher and student activities also influence the improvement of student learning outcomes, where there is a percentage increase in teacher and student activities at each meeting. Teacher activities at the first meeting were categorized as sufficient with 61.1% and increased at the second meeting classified as good with 77.8% and the third meeting increased to good category with a percentage of 80.6%. Student activities at each meeting also increased. The percentage of student activity at the first meeting was 58.3% classified as poor. In the second meeting, it was categorized as sufficient with a percentage of 66.7% and the third meeting increased in good category with a percentage of 77.8%.

Thus, the hypothesis in this study is accepted, namely: there is an increase in learning outcomes of grade 4 elementary school students between before (pretest) and after (posttest) applying the POE (predict-observe-explain) learning model. The results of the study show that the POE model is proven effective against student learning outcomes. From the beginning to the end of the lesson, the steps / stages presented by the POE model have been designed to direct students to explore the knowledge they had previously. This knowledge can come from material that has been obtained previously or even from experience in everyday life.

4. Conclusion

Based on the results of the research and analysis of the data obtained, it can be concluded that there is a significant difference between the results of the science learning outcomes of the fourth grade elementary school students between the results before (pretest) and posttest results using the POE (predict-observe-explain) explain learning model. The increase given by the POE model with an average gain of 0.56 including medium interpretation.

Improved student learning outcomes are supported by the percentage of teacher activity and student activity. The percentage of teacher activity at the first meeting amounted to 61.1% classified as sufficient and increased at the second meeting classified as good with a percentage of 77.8% and the third meeting increased in good category with a percentage of 80.6%. The percentage of student activity at the first meeting was 58.3% classified as poor, in the second meeting was categorized as sufficient with a percentage of 66.7% and the third meeting increased in good category with a percentage of 77.8%.

This shows that there is an increase in the science learning outcomes of fourth grade SDN 188 Pekanbaru students between before (pretest) and after (posttest) applying the learning model

POE (predict-observe-explain) that means that the POE learning model can significantly improve the science learning outcomes of class students four elementary schools

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