Implementation method experiments on student results on substances being material and its amendment in class VII SMP Negeri 22

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Abstract: The aims of this research were to know: (1) the average student learning outcomes in states of matter and changes the material that is taught by an experimental method in class VII SMP Negeri 22 Pontianak; (2) the average student laerning outcomes in states of matter and changes the material that is taught by conventional method in class VII SMP Negeri 22 Pontianak; (3) the average difference in student learning outcomes given the experimental method to the average student learning outcomes given conventional methods in states of matter and changes the material in class VII SMP Negeri 22 Pontianak . This research was a quasi-experimental design with Nonequivalent Control Group Design. The study population was all students of class VII SMP Negeri 22 Pontianak which consists of five classes, namely class VII A, VII B, VII C, VII D and E VII academic year 2015/2016, with a sampling technique that cluster random sampling. Based on the results of class VII A lottery was chosen as an experimental class and class VII D as the control class. The data collection technique used is the technique of measurement. Data collection tool used is a form of essay test. The hypothesis was tested using the t-test. Based on the results of data analysis can be concluded that: (1) the average student learning outcomes in states of matter and changes the material that is taught by an experimental method in class VII SMP Negeri 22 Pontianak is 64.96, (2) the average student learning outcomes in material states of matter and the changes that are taught by conventional methods in class VII SMP Negeri 22 Pontianak is 49.85, and (3) there are differences in the average student learning outcomes given the experimental method to the average student learning outcomes given in the conventional method material phase transition and changes in class VII SMP Negeri 22 Pontianak.

Keywords: the experimental method; states of matter and changes

1. Introduction

Physics is part of the natural sciences which provides students the knowledge, understanding, and ability to become the backbone for the development of science and technology. According to the Court, et al (2012), physics is the science which deals with the nature and symptoms, from the nature of the real (the visible) to abstract or even

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simply shaped pembahasanannya theory involves the ability of imagination or the involvement of a strong mental image. Therefore, in learning, students are required to actively and were able to prove an incident either through experiments in real terms and virtual.

In fact, the learning of physics for students strongly felt to be a scary thing, because students are always dealing with mathematical equations or formulas that make students bored in learning. Many students are lazy to follow the lessons of physics because it is considered boring.

It is shown from the results of observations conducted at SMPN 22 Pontianak, note that upon learning of students tend to be passive, role of the teacher in the learning process is still dominant. This is evident when the teacher explains the material most students just listen, take notes and when the teacher asked the students are reluctant and embarrassed to answer even when students are given the opportunity to ask also no students who dared to ask. Based on interviews with physics teacher at the school, there was information that in the process of learning physics, teachers rarely use the laboratories in schools, learning has been done still focused on the classroom and explanations by the teacher. Teachers do not make optimal use of the tools of physics when tools provided adequate practicum. Due to the lack of student involvement in the learning process to make students bored and less motivated to learn physics that ultimately make of that not maximal physics student learning outcomes.

For the purpose of learning can be achieved with good will require appropriate learning methods, the method of learning that keep students actively involved and make a high curiosity in students during the lesson. As one of the appropriate method is the experimental method.

Experimental method is the manner of presentation in which students experiment with their own experience to prove something question or hypothesis being studied (Sagala, 2013: 220). In the process of learning by experimental methods students are given the opportunity to experience for themselves or make their own, following a process of an object, analyze and prove and draw their own conclusions about an object, condition or process anything. With the experiment (the experiment) to train students to record all the data facts obtained through observation and opinion data is not the result of engineering thought. This is in accordance with the opinion (Roestiyah, 2008: 80), that the experimental method is one way of teaching, in which students conduct an experiment about a thing, watch the process and write the results of his experiments, and observations were conveyed to the classroom and evaluated by the teacher.

Suitable materials physics taught by an experimental method of which is the material manifestation of substance and amendments thereto. The material states of matter and its changes is a matter of physics that addresses the various states of matter such as liquid, solid and gas as well as the third amendment of the substance. Through the experimental method, students can observe the properties of the three states of matter and observe the phase transition process directly. Learning that involve students directly in observing the process of the invention the material will make students more active,

and skilled in the use of tools, skillfully arranging experiments and draw conclusions that will eventually be able to improve student learning outcomes.

It's like the findings obtained Risa (57: 2014), the research concluded that the application of the experimental method to contribute positively to improving student learning outcomes in a dynamic electrical material. The same was found Betty (53: 2014) that there is an influence on the application of the experimental method to student learning outcomes. Sri (50: 2014) stated that by using the experimental method can increase the value of learning outcomes or significant improvement.

Based on the exposure that has been presented, the study aims to determine: (1) the average student learning outcomes in the material states of matter and the changes that are taught by the experimental method in class VII SMP Negeri 22 Pontianak; (2) the average student learning outcomes the material states of matter and the changes that are taught by conventional methods in class VII SMP Negeri 22 Pontianak; and (3) the average difference in student learning outcomes given the experimental method to the average student learning outcomes given conventional methods on the material phase transition and changes in class VII SMP Negeri 22 Pontianak.

2. Research Methode

This research method is an experimental method that research procedures conducted to reveal a causal relationship with two or more variables controlling for the effects of other variables (Sugiyono, 2010: 2). Because the study was not able to control all of the variables that can affect the dependent variable is considered the form of the study is a quasi-experiment (quasi-experimental design) design with nonequivalent control group design (Sugiyono, 2013: 77).

The population in this study were all students of class VII SMPN 22 Pontianak which consists of five classes, namely class VIIA, VIIB, VIIC, VIID and VIIE totaling 156 students. The sampled as many as two classes selected by cluster random sampling. A Class VII as a given experimental class learning with experimental methods and class VII D as the control class given conventional learning.

The research data in the form of student learning outcomes in the cognitive states of matter and changes the material obtained by measurement techniques. Activity measurements in question is the provision of value to the learning outcomes of students in the experimental class and control class in taking the test. Instruments used form of essay tests amounted to 10 questions given after learning. Essay used the criteria and empirically valid contents with high reliability based on the formula of alpha.

Data processing student learning outcomes using parametric statistical tests using t-test. Data processing begins with the prerequisite test analysis in the form of normality test and homogeneity test data performed with SPSS. Test for normality using the Kolmogorov-Smirnov test is performed to determine the sample taken from the population is distributed normally or abnormally. While the homogeneity test data using Levene test-test is performed to determine a sample comes from a population that is homogeneous or inhomogeneous (Nurhayati, Fadillah and Mutmainnah, 2014: 3).

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3. Results and Discussion Research

Based on the draft study conducted in SMP Negeri 22 Pontianak consists of two classes, namely the experimental class and control class. In this study showed students of class VII SMP Negeri 22 Pontianak ie processing results graders experimental and control class.

Data student learning outcomes in initial tests and the final test can be presented in Table 1 below:

Table 1. Value Pre-test and post-test Grade Grade Control and Experiment

Class	High rated	Low rated	Average	Standard Deviation
Experiments	100,00	33,33	64,96	17,25
Control	75,33	12,23	49,85	21,28

Based on Table 1 it can be seen that the average student learning outcomes in the form of material substance and amendments to a given class learning with higher experimental method is 64.96 compared with the average results of students in classes taught by conventional teaching is 49, 85. While the value of the standard deviation of 17.25 experimental class and control class is 21.28. This shows that the experimental class deviation from the average value is much smaller than in the control class.

To find out the average difference in learning outcomes of students who are taught by an experimental method and the average student learning outcomes are taught by conventional study used statistical tests but first tested the prerequisite analysis includes tests of normality and homogeneity test data. Recapitulation of the prerequisite test analysis are presented in Table 2 and Table 3.

Table 2. Normality Test results Student Results In the Matter Being Substances and its amendment

Data	Class	*Kolmogorov-Smirnov*		
		Statistic	*df*	*Sig.*
Learning Outcome	Experiment	0,08	32	0,20
	Control	0,13	30	0,19

Table 3. Homogeneity Test Result Data Learning Outcomes On Being Creative Substance and its amendment

Data	*Levene Test*			
	Statistic	*df1*	*df2*	*Sig.*
Learning Outcome	2,280	1	60	0,136

Based on Table 2, the value of significance for the experimental and control classes respectively 0.200 and 0.132. Therefore siginifikansi value is greater than the significance level used is 0.05 then the normal distribution of data.

The significant value homogeneity test data using Levene test is 0.136 less than the significance level of 0.05 (Table 3). This shows that the homogeneous distribution data. Therefore, the data comes from a normal population and homogeneous then a statistical

test to test the research hypotheses using the t test. The test results statistically using the t test are presented in Table 4 below.

Table 4. Research Hypothesis Test Results

Dependent Variable	*Asymp. Significant*
Learning Outcome	0,003

Based on Table 4, shows that the significance value (0.003) is smaller than the significance level used (0.05). This indicates that the null hypothesis (Ho) is rejected and the alternative hypothesis (Ha) is accepted. This means that there are differences in average student learning outcomes given the experimental method to the average student learning outcomes given conventional methods on the material phase transition and changes in class VII SMP Negeri 22 Pontianak.

If seen from the average value for a given class of students learning with the experimental method is higher than the average grades of students for a given class of conventional learning. This difference is due, in classes taught by the experimental method, the involvement of students in learning much more than students taught using conventional learning. The experimental class, the teacher's role is no longer as the main model in the classroom, but teachers more as facilitators. Students in groups to discuss and plan experiment, equipment and materials used, conduct experiments, analyze experimental results until finally concluding the results of experiments that have been done. Then each group presented the conclusions they get in front of the class. The role of the teacher gives explanations and reinforcement of the concept of truth. It is as proposed by Roestiyah (2012: 80) that the experimental method is a way of teaching, in which students conduct an experiment about things, watch the process and write the results of his experiments, and observations were submitted to and evaluated by the class teacher.

Through the involvement of students directly in the learning process, making students become more interested in learning the material, and students will be able to connect or associate information or concepts that one with the concept of the other so that they are able to infer the learning that has been done, this is what makes learning meaningful for students. As stated by Ausubel, meaningful learning is the process of linking information or new material with concepts that already exist in the cognitive structure of students. Through meaningful learning, the concept was understood students will last a long time in the cognitive structure of students, causing students will obtain better value when tested than those who merely memorize.

The results of this study supported by the results of research conducted by Oktaviastuti and Anggaryani (2014: 1), to conclude that the experimental method of teaching physics can improve science process skills in high school students of class XI Wachid Hasyim 2 Taman Sidoarjo. A similar study conducted by Jaya, et al. (2014: 1), the results of the study found that the experimental method can improve science process skills such aspects observed at 86.9; aspects of preparing the hypothesis of 82.7; aspects of running a trial (experiment) of 86.9; concludes aspect of 79.5;and aspect communicating at 82.1.

Results of research conducted by Risa, (57: 2014) concluded that the application of the experimental method of making a positive contribution to the improvement of student learning outcomes in a dynamic electrical material

4. Conclusion

Based on the results of research and data analysis has been done, it can be concluded that: (1) the average student learning outcomes in states of matter and changes the material that is taught by an experimental method in class VII SMP Negeri 22 Pontianak is 64.96; (2) the average student learning outcomes in states of matter and changes the material being taught by conventional teaching in class VII SMP Negeri 22 Pontianak is 49.85; and (3) there are differences in the average student learning outcomes given the experimental method to the average student learning outcomes given conventional methods on the material phase transition and changes in class VII SMP Negeri 22 Pontianak.

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