

The influence of problem-based physics learning using guided inquiry toward scientific attitude

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Abstract. The process of physics learning should be carried out by scientific investigation or discovery, in order to grow the ability to think critically and be scientific so that it can solve the problem. This study aims to determine the influence of guided inquiry method on scientific attitude. This research is experimental research that is experiment class using problem solving method and control class using lecture method. The number of samples taken 60 respondents from a total of 120 respondents. Data collection techniques using questionnaires and hypothesis test research using t test. From the results of research indicate that there is influence of guided inquiry method toward scientific attitude, because t test shows $t_{count} = 5.994$ and $t_{table} = 2,004$.

1. Introduction

This phenomenon is caused by a conventional learning process in which the classroom atmosphere tends to center on the teacher and does not affect the size of the student itself, so students become passive. A teacher should guide how to keep students away from the decline of the times [1]. The learning process is the activity of teachers and students to achieve certain goals that have been determined and programmed in the curriculum. Based on the 2013 curriculum the learning objective is to equip students with knowledge, understanding, skills, attitudes and a number of abilities to develop science and technology. The 2013 curriculum emphasizes that the learning approach used in science is the scientific approach [2]. The teacher acts as a motivator for students to be more active in the learning process. The recommended learning steps in the 2013 curriculum include: 1) Presenting the problem; 2) Increase the question; 3) Conducting an experiment; 4) solve the problem; 5) give explanation in discussion 6) Conclusion drawing; 7) Closing.

A good learning paradigm shift is the teacher centered learning centered student orientation. The previously dominated methodology of the expository changed to participatory and the more textually original approaches changed into contextual. All changes are intended to improve the quality of student learning, both in terms of process and learning outcomes. The lesson should be oriented to the development of student knowledge independently. Students are trained to find independent learning information and actively create cognitive structures in interaction with their environment, thereby achieving student centered learning. The learning process should be endeavored so that students play an active role to develop their own knowledge and have a sense of full responsibility for the results they have gained. But in reality this is very far from expected. From this phenomenon, the researcher has an idea to seek the use of a learning model that can involve students actively in learning and make the students will accustomed to think deeply to capture and understand the conceptual relationships

presented by teachers. The nature of the problem in problem-based learning is the gap between the real situation and the expected conditions, or between the facts that occur with what is expected. The gap can be felt from anxiety, complaints, worries, or anxiety. Therefore, the subject matter or topic is not limited to the subject matter that is sourced from the book only, but can also be sourced from certain events according to the applicable curriculum [3].

The purpose of this study is to determine the effect of problem-based learning with guided inquiry method to students' scientific attitude. Piaget explained that "Every individual experiences the following levels of intellectual development: 1) motor sensory period (0-2 years); 2) pre-operational period (2-7 years); 3) concrete operational period (7-11 years); and 4) formal operational period (11 years and above)". Piaget assumes that the process of human thinking as a gradual development from concrete intellectual thinking to a sequential abstract through that stage. Thus if it is associated with the subject of this study, students of secondary school level have entered formal operational period as according to Piaget aged 11 years and over. Means can be understood that at this time students are already in the phase of development of the maximum brain so it is suitable if taught by using problem based learning approach with guided inquiry method [4].

2. Method

Variables in this study using two variables, namely independent variables and dependent variable. The free variable in this research is problem-based learning with guided inquiry learning method. While the dependent variable in this study is the scientific attitude of students. Population in this study amounted to 120 students. Sampling technique in this research is done by random (random sampling). This study uses guided inquiry learning method in the experimental class and using conventional learning model in control class. Researchers both provide a questionnaire instrument at the end of the learning in both classes. Data collection methods used in this study is a questionnaire method. used either or not then tested the validity and test. Analysis research data by calculating the mean (mean), stilation deviation. Before performing hypothesis testing, normality and homogeneity tests are performed. Meanwhile, to know the effect of problem-based learning with guided inquiry method toward students' scientific attitude, hypothesis testing is done with t-test. With the criterion of rejection or acceptance criteria hypothesis is as follows: accept H_0 if t_{count} lies between $-t_{table}$ with $t_{table} = t_{(1-1/2\alpha); dk}$ ie $(-t_{1-1/2\alpha}) < t_{cal} < t_{1-1/2\alpha}$ where $t_{(1-1/2\alpha)}$ is obtained from the t test distribution list with $dk = (n_1 + n_2 - 2)$, H_0 is rejected for t others with a sign fi cant level of 5%.

3. Result and Discussion

3.1. Results

The results of students' scientific attitude calculations on the high, medium and low categories in each class as in the following table 1.

Table 1. Result of Student Scientific attitude

No	category	problem-based physics learning using <i>Guided Inquiry</i>		conventional learning model using explanation	
		Number of students	Presentage (%)	Number of students	Presentage (%)
1	high	5	17 %	3	10 %
2	medium	23	80%	22	75 %
3	low	2	3 %	5	15%
		30		30	

Based on the data analysis, it was found that the students' attitude data on physics learning in the experimental class showed that the highest score was 90 and the lowest score was 55 with the standard deviation. While students' Scientific Attitudes on physics learning in the control class obtained the highest score of 90 and the lowest score 50 with standard deviation. From the data that have been collected is analyzed and then tested the normality of data, the results show that the experimental class

data obtained price KM = -0.75, $(-1 \leq -0.75 \leq +1)$ and the test results curve of the curve on the control class data obtained price KM = 0.16, $(-1 \leq 0.16 \leq +1)$. This is in accordance with the opinion of Sudjana (2005: 77) data is said to be normal distribution if the price of KM is between price -1 and + 1. It shows that the data has a normal distribution.

After doing some testing of mean and normality test then do homogeneity test. As for the result. Based on the F score obtained Fcount = 1.094 while Ftable = 1.896. Since Fcount < Ftable, then Ho is accepted and Ha is rejected. Thus, the variance in homogeneous research. After the data collected is normal and meet the homogeneity test then tested the hypothesis with t test. As for the result. Score count is then compared with score table at dk = n1 + n2 - 2 = 29 + 28 - 2 = 55. The result of the calculation, the Ttable price of the t distribution list is 2,004. The calculation result can be illustrated in the following curve.

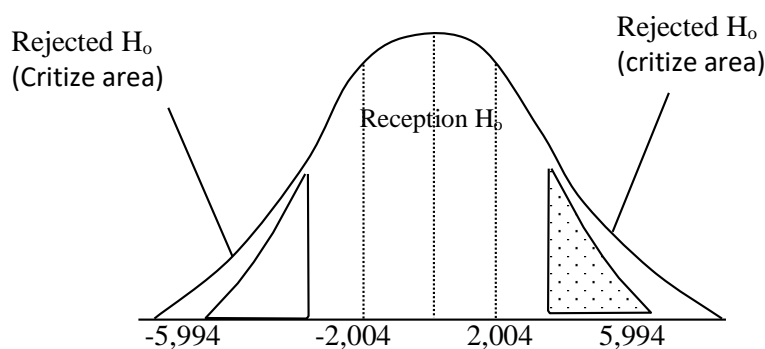


Figure 1 Reception and Rejection Curve Ho

Based on the results of t test Scientific Attitude Experiment class and control class obtained tcount price of 5.994 and ttable of 2.004. It shows that the price of tcount is not between range or $-t_{1-1/2\alpha} < t < t_{1-1/2\alpha}$, then Ho is rejected and Ha accepted. Thus it can be said that there is influence of Problem Based Physics Learning with guided inquiry method to Student's Scientific Attitudes.

3.2. Discussion

Based on the description in the description of statistics that have been described that Ho is rejected and Ha accepted This means that problem-based learning affects the students' scientific attitude. According to the average of the results of the analysis shows that learning by guided inquiry method shows better results than the learning by using the lecture method. One reason is that students are already familiar with the problem-solving learning patterns, although the steps taken are not like the steps in the real problem solving method. It is like the phrase "because problem solving is the center of physics learning" [5]. This means that the process of learning physics that focus and based on the process of abuse of physics problems, especially in the material of physics that are abstract is the center or orientation of problem solving approach. Another case with the lecture method is still considered a new ancient method for the students, so the learning process is only centered on the teacher alone.

The conclusions obtained from this result can be disclosed that the method of learning is an external factor that affects the attitudes of students, especially student achievement. The guided inquiry method has several advantages compared with the lecture method, in this model, the students can grow problem solving skills, act as problem solvers and in the learning process of thinking, group work, communicate, and inform each other. The process is certainly very supportive of students to develop knowledge, which affects the attitude of acceptance of something that affects the student's life.

A research has been done, that the difficulty level of the problem plays an important role in the effectiveness of student learning outcomes in all types of learning methods that use the problem. Problems with appropriate difficulty levels in the learner will be appropriate to their cognitive readiness, while the degree of difficulty of improper problems may exceed the reader's readiness and lead to failure [6]. Therefore this is what causes the method of learning is very influential on the cognitive aspects of students' affective attitude. Of course this will be more value because it makes students feel have

responsibility to be able to solve problems as well as possible. The results are also in accordance with the results of research conducted by other researchers, that 80.4% of students believe the effectiveness of the implementation of problem-based learning in the learning process. That is, problem solving learning is more effective when compared with conventional methods [7]. It can be concluded that a problem-based approach can improve students' rational thinking skills in physics learning, improve the effectiveness of physics learning, and overall provide a positive response for students on physics learning. In addition, the study says that: 1) the guided inquiry process helps students to gain meaningful learning by making connections between concepts and subjects help students recognize ideas and make it easier for them to understand the material; 2) learning through guided inquiry by utilizing cooperative learning environments, students are better able to develop their performance from the concept of acid and base and more positive than students learning by themselves and without guidance from teachers [8].

4. Conclusion

The result of data analysis of scientific attitude score in the experimental class (by applying the probing promoting learning model) obtained an average of 73.22. Highly categorized students were students who scored above score of 81 and totaled 5 students. The analysis of scientific attitude score data on the control class (by applying the conventional learning model) obtained an average of 68. The highly categorized students were the students who scored in top score 81 and amounted to 3 students. There is influence of the application of mass-based learning using guided inquiry method significant to the scientific attitude of physics learning students. For the results of hypothesis testing shows $t_{count} = 5.994$ and $t_{table} = 2,004$.

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