

IMPROVING STUDENTS' SCIENCE PROCESS SKILLS THROUGH PROBLEM BASED LEARNING TOWARD GLOBAL WARMING MATERIAL

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ABSTRACT

This research aims to describe the improvement of students' science process skills after the application of problem based learning models toward global warming material. The subjects of this research were students of class VII-A and VII-B in state junior high school 17 Surabaya as many as 32 students in each class. The type of research used is descriptive quantitative with one group pretest and posttest design. Data collection methods used were tests in the form of pretest and posttest. Data analysis techniques were performed statistically, namely homogeneity test and n-gain test. The results of the science process skills test in class VII-A provide N-gain results with a medium criterion of 56% and high criteria of 44%, while in class VII-B the criteria are medium at 53% while the high criteria is 47%. Based on the results obtained, it shows that the learning model of problem based learning is feasible to be applied in learning to improve students' science process skills.

Keywords: *Problem Based Learning, Science Process Skills,*

INTRODUCTION

In connection with the progress of the times in this global era, everything on earth has experienced development and renewal in the fields of health, government and education. The education sector continues to update the system, strategy, and the implementation process of education as evidenced by the continuous improvement of the curriculum in Indonesia through curriculum changes from KBK to KTSP and then become the 2013 Curriculum.

Based on the 2013 curriculum, science learning emphasizes learning objectives, namely direct learning experience through the use and development of scientific skills, knowledge and attitudes. Therefore, science learning must be done in an interesting, applicative and interactive manner which can involve students directly in the learning process activities.

Teachers are required to have the ability to be able to pursue the right model and help students to achieve basic competencies and aspects of learning actively. Learning models that can involve students actively such as guided discovery, guided inquiry, and problem based learning. In

addition, the teacher must also determine learning activities that can attract interest, be interactive and meaningful for students such as investigation activities. Through this investigation activity students can prove a theory that is obtained from both the student book, the internet and the teacher's explanation until the student realizes the meaning of the concept. In addition, investigation activities can also be used to improve science process skills and students' scientific attitudes. Science process skills are a set of skills used to construct students' knowledge through scientific learning (Ibrahim, 2010).

The researcher then conducted a pre-study to find out the percentage of science process skills possessed by students at state junior high school 17 Surabaya. Based on the pre-research results that have been conducted on 15 students showed that students' interest in the investigation activities in science learning amounted to 94% then for students' understanding of aspects of science process skills obtained the following data: formulating the problem 20%, making a hypothesis 46.5

%, identify variables 36.7%, analyze data 36.7% and make conclusions 23.5%.

In addition to questionnaires to students, an interview with one of the science teachers at state junior high school 17 Surabaya was also obtained. (1) Students were less interested in science; (2) Students experience difficulties in understanding science theories and concepts; (3) Investigations are rarely carried out in learning activities.

Based on the results of the literature review, observations and interviews conducted by researchers, it is known that the teacher needs a learning model that can develop science process skills, interest and active involvement of students during the learning process. The learning model that fits this goal is problem based learning. The problem based learning learning model is a learning model in which there is an authentic problem as a basis for students to gain knowledge (Innel and Balim, 2010). Where in this learning model, students are required to solve problems given through discussion and investigation activities so that students can develop science process skills, knowledge and scientific attitudes of students. This is because the problem based learning learning model is related to science process skills where in each syntax this model can bring up aspects of science process skills.

After the model and activities in learning, the teacher needs an authentic problem that is used as teaching material in the learning process. Problems that can be taken must be real and closely related to student life. This can help students to improve their ability to analyze and solve problems that are closely related to everyday life. Suitable material is global warming. This is because, global warming is an event that is very closely related to the lives of students because of their immediate impact. In addition, news on TV, radio, newspapers and the internet is incessantly discussing this event. However, students tend to consider that this material is less interesting even though it is related to their lives. This is because the students of global warming material are memorized material that is taught by discussion and lecture by their teacher so that it is not interesting.

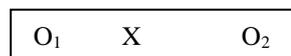
Therefore, through problem based learning learning models, the material of global warming that is considered less attractive will be made to be more interesting, interactive and meaningful through conducting investigative activities. As a result students can think and do with a series of scientific activities with associated science process skills so that they can increase interest, activity and understanding of learning for students.

Based on the description above, efforts are needed to improve students' science process skills through research entitled "Improving Students' Science Process Skills

Through Problem Based Learning Toward Global Warming Material".

METHODS

The type of research used in this study is descriptive quantitative research design with One Group Pre-test and Post-test Design.



O_1 = Pre-test

O_2 = Post-test

X = Treatment

(Sugiyono, 2012)

This research was conducted at state junior high school 17 Surabaya on February 5-27 2019 with the research subjects of class VII-A and VII-B Surabaya as many as 32 students from each class.

Data collection techniques used in this study were tests. The test was conducted twice, namely before (pretest) and after the application of the problem based learning (posttest) learning model, which was used to determine whether there was an increase in students' science process skills after the problem based learning model was applied to global warming material. The instrument used in this study is a matter that is oriented to science process skills, each item represents aspects of the science process skills that are trained. The pretest and posttest questions contain different questions, but the aspects and levels of difficulty are the same.

Data were then analyzed statistically by N-gain test both on the results of science process skills for each student and each aspect of science process skills. N-gain test is used to determine the improvement of science process skills for each student and each aspect of science process skills.

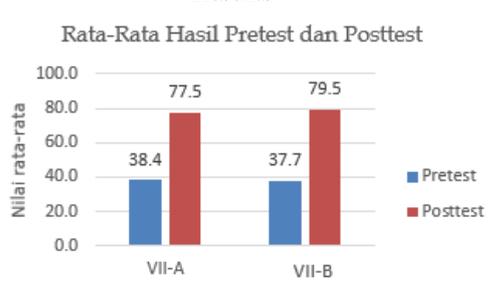
RESULTS AND DISCUSSION

Science process skills are a skill that is needed in scientific learning to find new concepts or develop previously owned concepts. Improving the science process skills of students is influenced by two factors namely internal and external (Sudibyo, 2018). Internal factors in the form of initial abilities possessed by students while external factors in the form of learning models used by teachers. Therefore, researchers chose a problem based learning learning model. This is because, the model has relevance to science process skills. Where the relevance of the syntax in each phase of the problem based learning learning model can bring up science process skills. The improved science process skills include 5 aspects, namely formulating problems, formulating hypotheses, identifying experimental variables, analyzing data and concluding. To determine the increase in science process skills of students after the

implementation of the problem based learning model, the results of the data analysis were obtained from the pre-test and post-test values using the n-gain test.

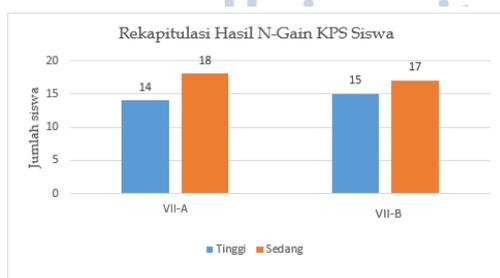
The pre-test was carried out before the action while the post-test was carried out after the action in the form of the problem based learning learning model. Data obtained from the study that the ability of science process skills students in class VII-A and VII-B experienced an increase. This can be seen in Figure 1 where there is an increase in the average results of the students' pretest and posttest both in class VII-A and VII-B.

Figure 1. Graph of Average Pretest and Posttest Results



The increase in the results of the student's pretest and posttest was because before the post-test was conducted, students were first given a series of learning actions through simple experiments that trained science process skills. According to Widodo et al in Kastawaningtyas (2017) science process skills can be trained by the way students gain direct experience during the learning process. The experience of direct learning can be done through a simple experiment where students can actively do solving real problems then analyze information, make inferences and make conclusions. The results of the pre-test and post-test value data were then analyzed using the N-gain test to determine the improvement of science process skills in each student presented in Figure 2 as follows :

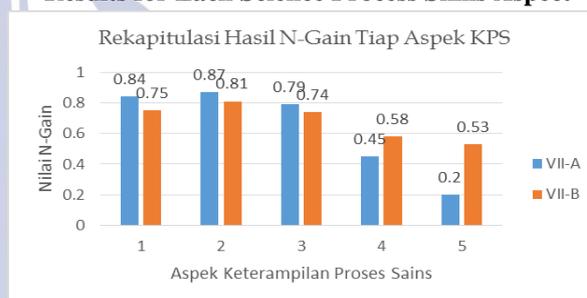
Figure 2. Graph of Recapitulation of N-Gain Science Process Skills Results for Each Student



Based on Figure 2, it is known that the science process skills of students in class VII-A and VII-B are divided into 2 criteria namely medium and high. Where in class VII-A there were 18 students with medium criteria and 14 students with high criteria. While in class

VII-B as many as 17 students have medium criteria while 15 students have high criteria. The difference in increase is due to several factors, namely students are less daring to ask the teacher when they find difficulties so that the teacher cannot give special attention to students who have a low level of understanding and the ability of each student to capture the information provided by the teacher. But overall, students experience an increase in science process skills after the implementation of a problem based learning learning model. This is in accordance with the research of Agustin (2014) which states that the problem based learning model is able to improve the science process skills of middle school students.

Figure 3. Graph of Recapitulation of N-Gain Results for Each Science Process Skills Aspect



In addition to the analysis of improving science process skills for each student, the N-gain test was also used to determine the improvement of science process skills in every aspect of science process skills. Based on Figure 3, it is known that the aspects of science process skills in class VII-A and VII-B with the highest n-gain value are formulating hypotheses which each get n-gain results of 0.87 and 0.81. This is because at the beginning of learning students are faced with problems that are closely related to everyday life, namely global warming and the teacher asks students to express their ideas and ideas with information that students already have so students can form hypotheses that refer to existing discourse texts. This is in accordance with Ibrahim's statement (2005) that by raising real problems in the environment, students can conduct an investigation to find the answer. Whereas the aspects with the lowest n-gain value are concluded which obtain n-gain results of 0.20 and 0.53. This can be caused by students who tend to underestimate aspects of conclusions because they are considered easy even though students have not been able to make conclusions correctly that is able to represent all contents written briefly, densely and clearly. In aspects of science process skills that have low criteria, the researcher as a teacher here acts by giving guidance to students in concluding correctly, concisely and clearly. But on average the overall aspects of the science process skills in classes VII-A and VII-B have increased.

This increase is because the learning model of problem based learning involves students actively in learning activities that train aspects of science process skills. According to Hung (2008) that problem based learning is a learning model that presents an authentic problem and students are required to play an active role in finding a solution. The process of resolving this problem is a challenge for students by organizing information that is owned and obtained so students can build solutions that contribute to meaningful experiences (Birgili, 2015). Where students here not only listen and see things taught by the teacher but also participate in the process of finding and finding conceptual meaning so students can develop thinking, communicating and science process skills. This is in accordance with Jerome Brunner's theory in which each student can find and find information for themselves through various activities and learning efforts. It plays a role in developing all the potential of each individual such as potential thinking, feeling, will, and skills so that the role of students will be more active in the learning process (Nursalim, 2007).

Increased science process skills are also supported by the results of training on the work of LKPDs that have improved from LKPD 1, 2 and 3. The work of LKPD is conducted in groups whose data is taken from simple experimental activities carried out during the learning process. It is used to train students about science process skills repeatedly so that students' skills can be maintained in long-term memory (Slavin, 2011). Therefore, this study shows that the application of a problem based learning learning model is feasible to be applied in science learning in improving students' science process skills.

Conclusions and suggestions

Conclusions

Based on the results of research and discussion that has been elaborated, it can be concluded that the application of problem based learning learning models to global warming material can improve students' science process skills. This can be proven by the N-gain results in class VII-A and VII-B divided into 2 criteria, namely medium and high. In class VII-A there were 18 students with moderate criteria and 14 students with high criteria. In class VII-B there were 17 students with moderate criteria and 15 students with high criteria.

Suggestions

Teachers should pay attention to the arrangement of time allocation in the learning process so that learning is more effective. This is because the experimental activities that contain science process skills require

relatively long time, especially in class VII, which is still not familiar with scientific activities.

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