

Application of Guided Discovery Learning Model with a Saintific Approach to Increase Student Creative Thinking about Global Warming Material at Senior High School

Febrin Kirana Pamela Putri, Madlazim

Physics Department, Faculty of Mathematics and Natural Science, State University of Surabaya
Email: mela.kirana@gmail.com

Abstract

Creative thinking is the ability to think that involves the ability to develop original ideas and connect the previous concept in a rational way. This research aims to describe the implemation of learning, increase creative thinking, and the response of students in guided discovery learning model with a scientific approach to the global warming phenomenon material. This research method is done with experimentation method with pre-experimental form and type of design one group pre-test post-test with use one experiment class and two classes of replication. Next, analysis the implementation of the learning is done by observation. Implementation on the three classes are observed from the teacher activity for two meetings was stated well done. Based on the analysis of n-gain creative thinking skills in the experiments classes and replication classes grade increase with high category. Learning which is done get students response very good category. Aspects of creative thinking include originality, fluency, flexibility and elaboration. Creative thinking abilities which get the lowest increase is flexibility. Overall learning by applying the model of guided discovery can increase students' ability to think creative..

Keywords: guided discovery, the scientific approach, creative thinking skills, symptoms of global warming.

INTRODUCTION

The development of education in Indonesia cannot be separated from the development of science, technology, and art (IPTEKS). This is in line with the new development in society, the world of work, and the world of science that has implications on the changes in curriculum. In the world of education, curriculum change means to improve education in every era.

The 2013 curriculum in Indonesia is currently the latest effort of the government to optimize curriculum standards in order to realize the national education objectives. The learning process in the current National Curriculum 2013 is implemented by using scientific activities, asking, trying, reasoning, giving and creating (Permendikbud No.22 th 2016). In the implementation of this scientific approach is a thinking process that needs to be trained continuously through learning for students. The scientific approach has a meaning as an approach contain some methods that must be based on the evidence of objects that can be observed empirically and measurably with specific set of principles. The scientific approach contains serial activity of data collection through observation and experiment, then formulating and hypothetical action. Scientific approach is

believed to be an alternative development of attitudes, skills and knowledge of students.

This is done by applying a scientific approach that touches three domains in learning, which are attitude, knowledge and skills. The scientific approach in learning is designed in such a way that learners actively build concepts, laws or principles through the stages of observing, asking, experimenting, reasoning, tasting, and creating. Students will better understand the knowledge or concept if the students are directly involved in the learning process. According to Udo (2010: 2) in his research it has been found that student-centered learning is more effective and it is recommended that schools should use student-centered learning.

In the learning process, students should act as subjects rather than as learning objects so that learning is centered on students rather than teachers. In addition, there is also a mindset of students who still rely on teachers as an important source of accurate and good information in the learning process. Students are more likely to believe what the teacher says and do not try to find out from other sources and choose silence when asked to argue. This of course makes students less than optimal in developing creative thinking skills because creative thinking involves curiosity

and ask (Johnson, 2011: 32). Students can learn more effectively by engaging their abilities through original ideas in their surroundings by connecting their knowledge and experience, so students can stimulate curiosity, observe, draw conclusions and gain experience through scientific processes. Therefore, students are required to find out, not be told so that it leads to the discovery learning process.

Thinking abilities are developed through core competencies of skills that demonstrate the skills of reasoning, cultivation and reciprocity; affective, creative, productive, critical, independent, collaborative, communicative, and solutive depending on existing learning (Permendikbud No. 21 th 2016).

In the learning process students should be encouraged to develop creative thinking skills. The ability to think creatively can be developed through the design of a lesson that emphasizes the exploration of the students ability. Because basically students have their own solutions in solving problems. According to Anwar, et al (2012: 5) there is a statistically significant relationship between creative thinking in academic achievements. In the modern era today, it is very necessary to create something creative and of course with the knowledge and skills that must be owned by each individual. According to Jannah (2015: 1) the learning strategy that is developed by raising a sense of curiosity and giving the learners pleasure in the learning process by making a discovery of a knowledge or concept independently is a guided discovery model of learning. Based on the results of preliminary study at SMAN 18 Surabaya, it was obtained from four indicators of creative thinking, only one indicator that was fulfilled, it is flexibility (flexibility). Furthermore, based on research from Aprilia (2014: 7) states that the guided discovery learning model shows the learning outcomes of each meeting obtained the value of student evaluation into the category of either with a range of values between 76-94 in class X IPA 2 SMAN 1 Park with a scientific approach and get good response for students.

The guided discovery learning model is a teaching approach where teachers model specific events and guide students to understand the examples. Guided discovery learning process can be done on physics subject accompanied by laboratory activities.

One of the materials of physics is about global warming. On the subject of global warming is more about daily events in the environment around students, they will be difficult to understand if only rely on knowledge from teachers only. In this guided discovery learning students are expected to be guided and able to prove the knowledge about global warming that has been obtained to solve the problem of global warming in everyday life.

Based on the discussion that has been proposed, the learning process is very necessary to improve students' creative thinking skills through a scientific approach using the model of guided discovery learners to solve the problems related to global warming in everyday life. Therefore the research proposed entitled "Application of guided discovery learning model with scientific approach to improve students' creative thinking ability on the subject of global warming symptoms in SMA"

METHOD

Type of research conducted by researchers is the type of Pre Experimental with one-group pretest-posttest. The classes used were one experimental class and two replication classes, each consisting of 27 students. All three classes are given equal treatment. The study was conducted in the even semester of the academic year 2017/2018.

The research instruments used were observation sheet, test sheet, and questionnaire. Before the research instrument is used, feasibility test is needed, that is validity, reliability, differentiation, and also difficulty level.

At the beginning of the meeting conducted pretest with the aim to determine the initial ability of students. After that, the students were given a treatment of learning the global warming symptom using scientific approach. Students were divided into four heterogeneous groups during the experiment. When the learning process takes place there is an assessment of the implementation of learning conducted by observers. Posttest is done after the learning to know the ability of students after receiving the material. Problems that was used pretest and posttest is same. In addition to posttest, at the end of the meeting students are also given a questionnaire to determine the student's response to the applied learning.

The result of the research is the students' pretest and posttest score, the result of learning instructional observation, and also the result of questionnaire of student response. The pretest and posttest values were tested by normality and homogeneity tests to find if the samples distributed normally and homogeneously. Furthermore, one-party t test and also gain test to know the improvement.

RESULT AND DISCUSSION

Based on the test of the problem to 28 students of class XI MIA found that from 12 tested questions, it was obtained 10 questions that are feasible to use and 2 questions that are not feasible to use. A total of 10 questions used is a valid and reliable problem with enough power as much as 9 questions and a good 1 question.

The result of observation of the implementation of learning by two observers found that there was an increase from the first meeting to the second meeting. This happens because there is an evaluation of the learning process by the observer when the learning is completed so that there is improvement in the next meeting. However, there are several stages that have decreased because teacher had less control in class and also lack of enthusiasm from students at the conclusion stage. Overall, the implementation of the learning process works very well.

The pretest and posttest results were tested for normality and homogeneity and it was found that the samples were normally distributed and homogeneous so that one-party test could be tested. The result of t-test of one party is found that t_{calc} in the experimental class, replication 1, replication 2 is 19,443; 20,411; 16.817, while the t_{table} value is 1.71. Based on that then $t_{table} > t_{calc}$ so H_0 is rejected and H_1 is accepted. This means that significantly the average gain obtained from the pretest and posttest values is significantly different. This means that the implementation of the guided discovery learning model with a scientific approach to improving students' creative thinking ability has been done very well.

In addition, the gain test to determine the improvement of students' creative thinking ability, and obtained as follows.

Table 4.1 The Result of Gain Analysis

No	Class	N<g>	Category
1	Eksperimen	0,84	Tinggi
2	Replikasi 1	0,86	Tinggi
3	Replikasi 2	0,72	Tinggi

Based on Table 4.1 it can be concluded that the improvement of students' creative thinking after applying the guided discovery learning model with scientific approach on the material of global warming symptoms from the three high categorical classes.

The result of observation of student's creative thinking ability is as follows

Table 4.2 the Average of Students' Creative Thinking Skill

No	Indicator	Pretest	Posttest	Gain
1	Fluency	29%	90%	61%
2	Flexibility	47%	95%	48%
3	Originality	42%	91%	49%
4	Elaboration	25%	82%	57%

Based on Table 4.2 it can be seen that all the indicators of creative thinking (Fluency, Flexibility, Originality, and Elaboration) have improved after applied guided discovery learning by scientific approach in experiment and replication class. Munandar (2009: 85) states that teaching with discovery in addition to the discovery can also improve the ability to think creatively.

Questionnaire results obtained the following data.

Table 4.3 Recapitulation of students responses

No.	% Average	Category
1.	97%	Very Good
2.	91%	Very Good
3.	90%	Very Good
4.	93%	Very Good
5.	89%	Very Good
6.	85%	Very Good
7.	89%	Very Good
8.	93%	Very Good

Based on Table 4.3 student responses of the three classes have very good criteria. In the first and second questions about learning that are interesting and can solve problems with various ways to get a very good

response. The third and fourth questions about the delivery of ideas and trying new ways of solving problems get a very good response from students. The fifth and sixth questions on material understanding and easier solving problems also got a very good response. The seventh and eighth questions received good responses from students about students' active and confident in solving problems

CLOSING

Conclusion

Based on the results and data analysis that has been done then the conclusions that can be taken are as follows:

1. Guided discovery learning by scientific approach on the material of global warming class XI in SMAN 18 Surabaya can be done very well.
2. Guided discovery learning with scientific approach applied to the material of global warming symptom of class XI at SMAN 18 Surabaya has an impact on improving students' creative thinking ability in each research class.
3. Guided discovery learning with a scientific approach on the subject matter of global warming symptoms applied is received excellent response in the three research classes.

Suggestions

Based on the research that has been done, researchers provide suggestions as follows:

1. We recommend tools and materials such as LCD, laptop and wi-fi prepared before the learning begin so that when the learning takes place tools and materials can function properly.
2. Preferably if using virtual laboratory activities should first understand the working principle of software that will be used or recognize the virtual lab site web address "science of everyday life" used when the activity.
3. Preferably teacher that apply guided discovery model learning with laboratory activities may consider the time allocation to be executed in a timely manner.

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