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The Implementasion of Guided Discovery Learning to Improve Student's Critical Thinking Skill in Simple Harmonic Motion at Senior High School

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Abstract

Student's critical thinking skills are important skills in learning. The critical thinking indicator in this research consists of 4 indicators. The result of observation in SMA Negeri 18 Surabaya shows only one indicator has been achieved that is the interpretation . For that purpose, the research is related the application of guided discovery learning to describe the implementation of learning, improvement of critical thinking skill, and student's response to simple harmonic motion. This research uses experimental method with pre-experimetal design and type of this research is one group pre-test post-test design using one experiment class and two replication classes. The implementation of the three classes observed from the teacher activity for two meetings was stated to be very well executed. Based on the analysis of n-gain, critical thinking skills in the experimental class and the replication class 1 increased with high category while in the replication class 2 increased with medium category. The learning proces get positive response from the students with very good category. The critical thinking skill that gets the lowest increase is the analysis. Overall learning by applying the guided discovery model can improve students' critical thinking skills.

Key word: guided discovery learning, critical thinking skill, simple harmonic motion

INTRODUCTION

The curriculum in Indonesia is a revised 2013 curriculum that prepares students to meet future needs and embraces the Indonesian Golden Generation of 2045. In the 2013 curriculum, revisions have been set in the standards competency of graduates based on the competence of the xxi century, Indonesia demographic bonus, the potential of Indonesia to be a group. The world's 7 largest economies and strengthening Indonesia's contribution to the development of world civilization (Permendikbud, 2016). Qualified human resources are not only based on science but must be supported with skills.

In the 2013 curriculum the revisions in core competencies demonstrate effective, creative, productive, critical, independent, collaborative, communicative and solutive skills in concrete and abstract realms related to the development of what they learn in school, and are capable of using appropriate methods With scientific principles (Permendikbud, 2016). One of the efforts in the field of education to print the Golden Generation of Indonesia Year 2045 quality is to familiarize the forming of a culture of critical thinking to students in the learning process.

Critical thinking is a reflective thinking skill that focuses on decision-making patterns of what to believe and what to do (Ennis, 2011). According to Johnson (2010) critical thinking is an integrated process enabling one to evaluate the evidence, assumptions, logic and language that underlies the thinking of others. Critical thinking also help students to improved the skills of analyzing the concrete and abstract.

In critical thinking skills, there are several indicators that must be met. According to Facione in Denni K. Filsame (2008) these indicators include Interpretation, Analysis, Evaluation, Inference, Eksplanasi, and Self Regulation. Through the indicators mentioned, it can be known the level of critical thinking skills of students. Development of critical thinking skills in learning needs to be optimized by applying appropriate and innovative learning strategies, so that the learning process is optimal and able to develop students' critical thinking skills.

Based on the results of observations that have been done by provided tests to know the critical thinking skills of students in SMA Negeri 18 Surabaya is known from the six indicators of critical thinking skills, only one indicator that has been achieved that is the interpretation. More than 50% of students can answer questions about interpretation. Meanwhile, the problem for other indicators less than 50% of students answered correctly. Based on the results of preliminary research showed that students critical thinking skills in handling problems are still low. Critical

thinking skills can be improved by providing new innovations in the learning process. According to Arianto, etc. (2015) the guided discovery learning model influences critical thinking skills.

A learning model that can help provide new innovations is a guided discovery learning model. Hamalik (2006) states that the guided discovery learning model is a two-way system where the learning process involves students and teachers. Students make discovery and teachers provide guidance in solving problems faced by students. The guided discovery learning model helps students to learn or learn new things through their discoveries. Findings by students will help to provide understanding that comes from what students have done. The teacher's role of the learning process is to guide students in discovery activities that can build student understanding.

The syntax of guided discovery learning model includes: motivation, data collection, data processing, cover (Carin, 1993). Teachers have a number of competence and behavior that can be observed in learning with guided discovery model such as organizing physical units in teaching to encourage the idea to students in learning discovery, helping students in explaining the roles that need to be done through the process of discussion together, checking understanding students to the problems given to start learning discovery, giving students the opportunity to express the knowledge they find to their friends in collecting and reconstructing the data so that they gain new insights, listen and provide learning experiences that enable students to develop their own responses.

This learning model gives students the freedom to acquire knowledge based on the invention. Guided discovery involves students discovering the meaning, organization, and structure of ideas (Carin, 1993).

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Based on the above description the authors conducted a study entitled "Application of Guided Discovery Learning Model to Improve Student Critical Thinking Skills on Harmonic Motion Material in SMA". The study was conducted to describe the implementation of learning, the improvement of students 'critical thinking skills, and the students' responses to guided discovery learning on harmonic motion materials

METHOD

The research design used in the pre-experimental design used in this study is illustrated as in Table 1

Tabel 1 Design of research

Class	Pre-test	treatment	*Post-test*
Experiment	O_1	X	O_2
Replication 1	O_1	X	O_2
Replication 2	O_1	X	O_2

(Sugiyono, 2009)

Note:

O_1 = Mesurement the student critical thinking skill before learning process (pre-test).

X = Learning process using guided discovery models.

O_2 = Measurement the student critical thinking after learning process (post-test)

The research was conducted at SMAN 18 Surabaya using three classes in class X. The research instruments used were observation sheet, test sheet (pretest and posttest) consisting of 10 essay questions. Data analysis technique used is analysis of learning implementation, normality test, homogeneity test, paired t test, and gain analysis.

RESULT AND DISCUSSION

The research started with pre-test to know the student initial critical thinking skill and determine the research subject.

Based on pre-test Conducted prerequisite test that is normality and homogeneity test. The result showed that the research subjects used were normal and homogeneous distributed.

The implementation of guided discovery learning works very well. The result of accumulation of average score from two observers in experiment class, replication I, and replication II ranged between good and excellent category. This indicates that the teacher is able to manage the learning process in accordance with the Learning Implementation Plan (RPP) that has been prepared.

The hypothesis in this study was tested using paired t test and gain analysis. Before the t test was done, pretest and posttest preliminary results were tested on the prerequisite of normality test and homogeneity test. It was found that the pre-test and post-test were normally distributed and homogeneous

A paired t test is used to determine whether the post-test grade of students is significantly improved or not

Table 2 Two tail t-test

No.	Class	t_{hitung}	t_{tabel}
1	Experiment	30,39	1,70
2	Replication I	30,95	
3	Replication II	15,68	

Based on Table 2 obtained which means rejected. It was concluded that the post-test value significantly improved from the pre-test value. This indicates a significant increase in students' critical thinking skills after a learning process with a guided discovery learning model.

Gain analysis in this observation used to know the enhancement of student critical thinking skill.

Tabel 3 n-gain score

No.	class	N<g>	Category
1	Eksperiment	0,70	Tinggi
2	Replication I	0,71	Tinggi
3	Replication II	0,52	Sedang

Based on Table 3 it can be seen that the three classes have an increase in critical thinking skills. There is a difference in the improvement of critical thinking skills in which the experimental class and replication class 1 increased significantly with the high category while in the replication class 2 increased in the medium category. This is because the students' response to the experimental class 2 is the lowest response of the experimental class and the replication class 1 so that the improvement of critical thinking skills in the replication class 2 is not optimal.

Critical thinking skills before and after learning have increased. Based on the four indicators in this study, the highest score indicator is interpretation because interpretation indicator gives the students the opportunity to freely express their opinions without any limitations, so this indicator is considered the easiest among other indicators. The indicator that has the lowest value is the evaluation of this situation, the evaluation indicator requires the students to compare several factors that are bound to the limitations so that the student is limited to perform the indicator. Evaluation indicators are considered to be the most difficult indicators

CLOSURE

Conclusion

The guidance of guided discovery learning model to improve students' critical thinking skills is done in very good category.

Improving students' critical thinking skills with the application of guided discovery learning models on harmonic motion materials increases with high category in experimental class and replication 1 and obtains moderate category in replication class 2.

Student responses to the learning model of discovery to improve students' critical thinking skills on harmonic motion materials show an excellent positive response

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Suggestion

Assessment of critical thinking skills should be done cognitively and psychomotor so that critical thinking skills can be assessed maximally.

Research on critical thinking skills requires longer study time so as to improve critical thinking skills should be done continuously.

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