**IMPROVING STUDENT’S CRITICAL THINKING SKILLS THROUGH GUIDED DISCOVERY LEARNING TO STASIONARY WAVE**

Virlinda Al Siska, Hainur Rasid Achmadi

Physics Department, Faculty of Mathematics and Natural Science, The State University of Surabaya

Email: virlindasiska@mhs.unesa.ac.id

Abstract

Student’s critical thinking skills are important skills in learning. Indicators of critical thinking in this study consisted of four indicators. The result of observation in SMAN 1 Gedangan shows only one critical thinking indicator has been reached is an indicator interpretation. Therefore, the research was related the application of guided discovery learning to describe the implementation of learning, improved critical thinking skill, and the response of students to stationary wave. This research used experimental method with pre-experimental design and type of this research is one group pre-test post-test design using one experiment class and two replication class. The implementation of the three class observed from the teacher activity 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 2 increased with medium category. The learning process get positive response from the students with very good category. The critical thinking skill that gets the lowest increase is the interpretation. Overall learning by applying the guided discovery model can improve critical thinking skills of students.

**Keywords**: guided discovery learning, critical thinking skill, stationary wave

**INTRODUCTION**

In the 2013 curriculum revision in the core competition one of the skills that are demonstrated critical thinking skills. Establish a culture of critical thinking is one of the efforts in the field of education for the Golden Generation produce 2045 qualified. In addition, research Firdaus Ismail Kailani, Md Nor Bin Bakar, Bakry (2015) states that the critical thinking skills necessary for success in the future so that students should be applied in the process of learning to produce quality students in leading the future. Critical thinking is a reflective thinking skill that focuses on pattern making decisions of what to believe and what to do (Ennis, 2011).

 Based on the results of questionnaires given to students of class XII Mathematics at SMAN 1 Gedangan, obtained by percentage of 70% clarified that teacher of physics at the time of presenting the material is to use the lecture method, which is the lecture method is a method of presenting information explained in class. In addition to the questionnaire were also given about the tests to determine the critical thinking skills of students at SMAN 1 Gedangan known of the four indicators of critical thinking skills, only one indicator has been achieved that was interpretation. Students can answer the indicators interpretation with the percentage of 63%. Whereas the other indicators like analysis, evaluation, and explanation less than 50% of students answer questions correctly. From the results of initial studies indicate that the critical thinking skills of students are low. Those problems can be overcome by providing innovations in the learning process.

 One instructional design to provide new innovations in SMAN 1 Gedangan is guided discovery learning model (guided discovery). Guided discovery learning model is a model of learning to develop ways students actively to determine for themselves, to investigate itself, then the results will be long-lasting in the memory and improve the critical thinking process learners (Asmani, 2010). The advantages of this learning model are the material that absorbed students can imprint longer because students are involved in the discovery process. In addition, research Akanmu, M. Alex and Fajemidagba, M. Olubusuyi (2013) state that the discovery Guided help students extract intricate knowledge becomes simpler.

 Based on the description above, researcher conducted a research with the title of Improving Student’s Critical Thinking Skills Through Guided Discovery Learning to Stasionary Wave.

**METHOD**

In this research using quantitative research with pre-experimental design methods. There are three classes used that one experimental class and two classes of replication. The model used is guided discovery learning model for know the level of critical thinking students.

This research uses three classes as a sample of class XI MIA 1, 3 MIA XI and XI MIA 4 as an experimental class and two classes of replication, The research design will be used as follows:

$$O\_{1}\rightarrow X\rightarrow O\_{2}$$

Infor;mation:

O1 : measurement of critical thinking skills students before the learning process (pre-test)

X : guided discovery learning model

O2 : measurement of critical thinking skills students after the learning process (post-test)

(Sugiyono, 2009)

The method used for data retrieval is the method of observation, tests and questionnaires. Observations conducted to determine the enforceability of guided discovery learning model. The test is used to determine to analyze the critical thinking skills of students with instruments, pre-tests and post-tests. While the questionnaire used to evaluate the response of the students in learning activities.

**RESULT AND DISCUSSION**

The results of pre-test and post-test were used to test for normality and homogeneity. Requirements to test for normality $χ^{2}\_{count}\leq χ^{2}\_{table}$, Based on data obtained from all three classes used as samples are normally distributed and homogeneous with a significance level α = 0.05.

Having ascertained the data is homogeneous and normally distributed, then the paired t-test to find significant or not an increase in the value of the post-test students. t-test results are presented in Table 1.1.

**Table 1.1** The t-test results

|  |  |  |  |
| --- | --- | --- | --- |
| **Class** | $$t\_{count}$$ | $$t\_{table}$$ | **Conclusion** |
| **Experiment** | 33,39 | 1,70 | H0 rejected |
| **Replication 1** | 18,96 |
| **Replication 2** | 20,46 |

Based on paired t-test of the three classes obtained the result $t\_{count}>t\_{table}$ , then H0 rejected and H1 accepted, where H0 stating the average increase did not differ significantly, while the average increase in H1 states differed significantly. So the conclusion of post-test score increased significantly from pre-test value. This shows once through guided discovery learning process an increase in critical thinking skills in students significantly.

To determine the degree of difference between the pre-test and post-test values, then the n-gain analysis. n-gain analysis Results are presented in Table 1.2.

**Table 1.2** The results of the analysis of n-gain

|  |  |  |  |
| --- | --- | --- | --- |
| **No.** |  **Class** | **n-gain** | **Category** |
| **1** | **Experiment** | 0.749 | High |
| **2** | **Replication 1** | 0,747 | High |
| **3** | **Replication 2** | 0.683 | Moderately |

Based on the analysis of n-gain, it is known that the difference in the increase in critical thinking skills where the experimental class and replication 1 increased significantly with higher categories, while the replication 2 increased with the medium category. This can happen because of the response of students in replication 2 is lowest of experiments and replication 1 so that an increase in critical thinking skills in replication 2 is less than the maximum.

Based on analysis of the gain is normalized, then the three classes have increased critical thinking skills. Critical thinking skills of students in this research appeared to increase in each indicator. Improved critical thinking skills are presented in Table 1.3.

**Table** 1.3 Improved critical thinking skills

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No.** | **Indicator** | **Pre-test** | **Post-test** | **Increase** |
| **1** | **Interpretation** | 35% | 70% | 35% |
| **2** | **Analysis** | 43% | 89% | 46% |
| **3** | **Evaluation** | 43% | 91% | 48% |
| **4** | **Inference** | 21% | 78% | 57% |

Based on the results that have been obtained, the conclusion of all indicators of critical thinking has increased after application of guided discovery learning model in the experimental class, replication 1 and replication 2.

Known to increase the evaluation of the three class received the highest growth compared with an increase of three other indicators that interpretation, analysis, and inference it is because at the time of filling the post-test many students who call only answer without mentioning the reason that score in the item about interpretation of the indicator is smaller than the other indicators of critical thinking, while the evaluation indicators obtained the biggest increase since at the time of filling the post-test students do not just write down the answers alone but in a way or reason that scores on the item about evaluation indicators obtain a high score.

**CLOSING**

**Conclusion**

Implementation guided discovery learning model very successfully. Improved critical thinking skills of students after application of guided discovery learning model increases with height category in the experimental class for 1st replication , while the 2nd replication gain medium category. The response of students to guided discovery learning model to improve critical thinking skills showed a positive response to the very good category.

**Suggestion**

Following the research, the researchers gave suggestions for future research are: critical thinking skills assessment should be carried out so that the cognitive and psychomotor skills of critical thinking can be rated to the max. Research to assess critical thinking skills require a longer learning time so as to improve the critical thinking skills should be carried out continuously.

**REFERENCES**

Akanmu, M. Alex and Fajemidagba, M. Olubusuyi, 2013. Guided-discovery Learning Strategy and Senior School Students Performance in Mathematics in Ejigbo, Nigeria. *Journal of Education and Practice,* 4, No.12(12), p. 85.

Asmani M, 2010. *Panduan Efektif Bimbingan dan Konseling di Sekolah.* Jogjakarta: Diva Press.

Ennis, 2011. *The Nature of Critical Thinking: An Outline of Critical Thinking Dispositions and Abilities.* Chicago : Universitas of Illions.

Firdaus, Ismail Kailani, Md. Nor Bin Bakar, Bakry, 2015. Developing Critical Thinking Skills of Students in Mathematics Learning. *Journal of Education and Learning,* 9(3), p. 233.

Sugiyono, 2009. *Metode Penelitian Kualitatif dan R&D.* Bandung: Alfabeta.