

# THE EFFECTIVENESS OF THE SETS-ORIENTED GUIDED INQUIRY MODEL LEARNING DEVICES TO TRAIN STUDENTS' CRITICAL THINKING SKILLS

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## Abstrak

Penelitian ini bertujuan untuk mendeskripsikan keefektifan perangkat pembelajaran model inkuiri terbimbing dengan pendekatan *SETS* untuk melatih keterampilan berpikir kritis peserta didik. Keefektifan perangkat pembelajaran dianalisis berdasarkan hasil tes keterampilan berpikir kritis dan respons peserta didik terhadap pembelajaran. Teknik pengumpulan data dilakukan dengan metode tes dan metode angket. Metode tes digunakan untuk mengetahui ketercapaian keterampilan berpikir kritis peserta didik, sedangkan metode angket digunakan untuk mengetahui respons peserta didik terhadap perangkat pembelajaran yang digunakan. Uji coba terhadap perangkat pembelajaran dilakukan pada 75 peserta didik kelas VIII MTs Nurul Huda menggunakan metode *one grup pre-test post-test design experimental*. Hasil analisis data menunjukkan bahwa skor keterampilan berpikir kritis peserta didik mengalami peningkatan setelah diterapkannya pembelajaran *SETS* dengan kategori tinggi. Selain itu, sebagian besar peserta didik memberikan respons positif terhadap komponen pembelajaran dan menunjukkan minat yang baik untuk mengulangi pembelajaran dengan pendekatan *SETS*. Berdasarkan hasil analisis data, dapat disimpulkan bahwa perangkat pembelajaran model inkuiri terbimbing dengan pendekatan *SETS* efektif digunakan untuk melatih keterampilan berpikir kritis peserta didik.

**Kata Kunci:** Inkuiri Terbimbing, *SETS*, keterampilan berpikir kritis.

## 1. INTRODUCTION

Mastery of critical thinking skills is one of the fundamental skills that demand skills in the 21<sup>st</sup> century known as 4C, which includes critical thinking and problem solving, creative and innovative skills, as well as skills in communicating and working together in groups (Bialik, et al., 2015). Critical thinking is the ability to think where a person tests, performs and makes assessments of conclusions based on evidence of previous knowledge (Eggen&Kauchak, 2012). Critical thinking skills are needed by someone in facing the digital era with various sources of information, in which a person needs to have critical thinking skills which include interpretation, analysis, evaluation, inference, explanation and self-regulation (regulation) to choose sources and information relevant, finding quality sources, and assessing sources from the aspects of objectivity, reliability, and up-to-dateness (Facione, 2015).

The results of the 2018 PISA Mapping published by the *Organization for Economic Co-Operation and Development* (OECD) show that the learning performance position of Indonesian students is ranked 75th out of 80 countries. In the field of science, Indonesian students score 396, which results have decreased compared to test results in 2015 which got a score of 403. Thus Indonesian students according to the results of the

PISA mapping are deemed not to have mastered the skills and knowledge to compete and participate in the world of work in 21<sup>st</sup> century. Preliminary studies conducted in class IX-1 MTs Nurul Huda also show the same thing. As many as 84% of students were in the very less critical category, with an average percentage of students' critical thinking skills only reaching 22%.

Based on the description above, one of the first steps that can be taken is to improve science learning in schools. This improvement can be done by compiling a learning model and an appropriate approach so that the expected goals can be achieved optimally. One learning model that is in accordance with the characteristics of science and is innovative learning is learning through a scientific discovery process, namely learning with a guided inquiry model. Guided inquiry model is learning that requires students to investigate or seek answers to educator questions (Jufri, 2013). In this case, thinking skills play an important role in the guided inquiry learning model which aims to investigate answers. With the application of guided inquiry learning, students are expected to have a greater curiosity so as to encourage them to be more active and creative by finding information on their own, either through reading, asking questions or experimenting.

One of the goals of science learning (IPA) according to Walsh et al (2007) is to form humans who can solve complex problems by applying their knowledge and understanding to everyday situations. Efforts that can be made to teach natural science that are integrated with everyday life situations are to apply the SETS approach (Prasojo, 2020). The SETS approach is intended to help students know that science and its development can mutually affect the environment, technology and society (Binadja, 2000). The SETS approach can be started by presenting simple, real concepts that are found in the environment of everyday life. Science learning with the SETS approach is designed contextually by bringing students to simple problem situations which are then linked to the concept of science in an integrated manner in a reciprocal relationship between elements of science, environment, technology and society. Thus, it is hoped that SETS education can provide sufficient provisions to welcome the era of globalization that will occur in the future.

Research related to the guided inquiry model learning through the SETS approach previously conducted by Afrianis, Binadja, and Susilaningasih (2017) shows that learning using the guided inquiry model with SETS vision can improve critical thinking skills of class XI IPA students at SMAN 1

- $O_1$  : The initial test (*pre-test*) which is carried out before being given the treatment is the use of the developed learning devices.
- X : The treatment is carried out by applying the developed learning devices.
- $O_2$  : The final test (*post-test*) was carried out after giving the treatment.

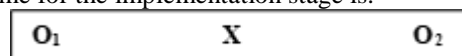
Kampar. This is evidenced by an increase in the results of the N-Gain analysis from the high category *pretest* and *posttest* for critical thinking skills. Meanwhile, the indicators of critical thinking skills tested include indicators of providing basic explanations, building basic skills, generalizing, hypothesizing, and applying concepts. The second research on SETS by Shafarina, Leny, and Kusasi (2018) was proven to be able to improve critical thinking skills of class XI PMIA 2 SMAN 3 Banjarmasin students on colloid material from a score of 66.04 with a fairly critical category to 83.61 in the critical category. In addition, students' responses to the tools and implementation of learning were very positive.

Based on relevant previous researches, it is known that the more critical thinking skills are trained, the more useful it is. In addition, the two previous relevant studies have differences with this study. This study focuses on the SETS approach which includes several stages, including the stage of presenting the problem, concept formation, concept application, conceptualization and evaluation in order to practice critical thinking

skills. All learning devices are arranged based on the SETS-oriented guided inquiry model to practice critical thinking skills, especially in indicators of interpretation, analysis and inference. In addition, the object of the research was students of eighth grade students with substance stress learning materials. The material was chosen because it was in accordance with one of the basic competencies in science subjects at the eighth grade of SMP / MTs, namely basic competency 3.8 which reads "explaining substance pressure and its application in everyday life" (Kemendikbud, 2016). Basically, natural phenomena and the application of the principles of substance stress are often found in everyday life and most of them are related to technology, environment and society. Therefore, the development of learning devices through guided inquiry models that are SETS-oriented is suitable to be applied to substance pressure material in order to train students' critical thinking skills.

## 2. RESEARCH METHODS

This research was conducted using learning devices arranged following the flow of the Dick and Carey development model. At the implementation stage, the trial was carried out using the *one group pre-test post-test experimental design* method. The trial was conducted on 75 eighth grade students at MTs Nurul Huda. The trial scheme for the implementation stage is:



Picture 1. One Grup Pre-Test Post-Test Design Experimental Scheme

Note:

The data collection technique was done by using a questionnaire method and a test method. The data analysis technique used is the analysis of the effectiveness of learning devices in terms of the achievement of critical thinking skills and student responses.

## 3. RESULTS AND DISCUSSIONS

### A. RESULT

The results of this study were in the form of the effectiveness of the learning devices which could be seen from the results of the critical thinking skills test of students and the students' responses to learning that was carried out using the guided inquiry model through SETS orientation. The following shows the data on the results of the effectiveness of learning devices for each of these aspects.

#### 1. Critical Thinking Skills

The data on the results of this effectiveness were taken through *pre-test* and *post-test* activities using questions that were structured to measure students' critical thinking skills with indicators of interpretation, analysis, *inference*. The results of

the students' critical thinking skills can be presented in Table 2.

**Table 2.** *N-Gain* Test Results for Each Indicator of Critical Thinking Skills

Indikator	Kelas VIII-1		Kelas VIII-2		Kelas VIII-3		N-Gain
	Pretets	Postte N-st	Prete N-Gainst	Postte N-st	Pretes N-Gaint	Posttes N-t	
Interpretation	22,55	79,26	0,73	25,61	77,30	0,69	18,59
Analysis	20,90	75,30	0,69	20,21	76,57	0,71	17,57
Inference	20,48	77,62	0,72	22,86	76,52	0,69	25,23

Based on Table 2 above, students in the three classes experienced an increase in their mastery of critical thinking skills for each indicator, with the analysis indicator being the indicator with the lowest increase category compared to other indicators.

## 2. Students' Responses

The effectiveness of the learning devices developed can also be seen from the responses of students to learning. Student response results data were obtained through a questionnaire that was filled in by students after carrying out all phases of learning. Students in the three classes showed identical responses, where they responded positively to the attractiveness of the learning component.

Most students also feel that the learning carried out has a positive impact on their critical thinking skills. Students feel that after learning, critical thinking skills which include the ability to interpret, analyze, *inference* (make alternative guesses and conclude) become easier to do and achieve.

## B. DISCUSSIONS

### 1. Critical Thinking Skills

Based on the *N-Gain* analysis, it can be seen that the critical thinking skills of students have increased after the implementation of the guided inquiry learning model oriented to *SETS*, both in classes VIII-1, VIII-2, and VIII-3. This result is in accordance with the research by Afrianis, *et al.*, (2017) where the implementation of guided inquiry learning model with *SETS* vision can improve students' thinking skills with the results of *N-Gain* analysis of 0.834. Research conducted by Kisworo, *et al.*, (2018) with the research title "The Implementation of *SETS*-Based Guided Inquiry Model in Petroleum Material on Students' Critical Thinking Ability" also shows that *SETS* learning is very efficiently applied to improve critical thinking skills of students by 75%. In addition, research from Budi, *et al* (2018) entitled "*Natural Science Modules with SETS approach to improve students' critical thinking ability*" showed similar results. So, it can be concluded that the *SETS* approach module has helped students in improving critical thinking skills.

In this study, through the phases of the guided inquiry model through the *SETS* approach, students were trained to do interpretation, analysis, and inference. The activities carried out in this stage are experiments to find concepts related to substance pressure. Through experiments, the teacher presents the phenomena that occur in everyday life, then students are asked to interpret these phenomena based on their previous knowledge. After interpreting, students are trained to collect data through experiments independently. Furthermore, students are trained to analyze data to ensure whether the experimental results are in accordance with the concept. Analysis is the ability to identify a statement, question, or concepts that are the topic of the problem. After conducting the analysis, students must conclude the experimental results by seeing the suitability of the concept with the results of data analysis. *Inference* is the ability to identify and obtain the elements needed to make reliable conclusions, make assumptions and hypotheses, questions and other forms of representation (Facione, 2015).

Broadly discussing, students' critical thinking skills tend to increase, but analysis indicators are still the lowest indicators of mastery. Analysis is the ability to correlate information obtained with solving concepts and strategies while finding relevant evidence to find the right solution (Facione, 2015). Evaluation questions developed for analysis indicators demand the ability of students to understand concepts, where students must have the ability to integrate information and generalize their knowledge into other related matters. When viewed from the students' answers, most students were able to understand what was being asked in the questions, but students still had difficulty connecting the concepts used in solving the questions.

In this study, the average of the three classes experienced an increase in critical thinking skills with the Critical category, but there were still six students who were still in the less critical category with low *posttest* scores (<60). This can be caused by several things, namely, (1) There is a possibility that students in the class do not support certain learning activities because of individual learning preferences, as stated in Howard Gardner's theory of multiple intelligences (Musfiroh, 2014), (2) Intrinsic motivation every student is different, students with higher intrinsic motivation will more easily absorb new things and try to be able to solve problems by exerting their critical thinking skills, while students with low intrinsic motivation only follow modest learning (Khoiriyah, *et al.*, 2018), (3) There is a possibility that some students need more study time to handle activities effectively (Nisak, *et al.*, 2017).

During the learning process, there are several obstacles experienced by researcher such as

students who are not used to doing experiments independently, so that in conducting experiments tends to be slow, as a result the learning time is reduced. In addition, most students also do not understand how to formulate problems, make hypotheses, and identify variables, so that teachers need to provide guidance to students in formulating problems, making hypotheses, and identifying variables. The most difficult obstacle to experience is practicing critical thinking skills in students. In this case, there are still some students who have difficulty taking tests of critical thinking skills. Therefore, the role of the teacher is needed in providing learning that trains students' critical thinking skills. In this case, of course more time is needed so that students can adapt to the learning model so that students get used to thinking critically. In addition, high teacher skills are needed in managing the class so that learning can run effectively and the class is not too busy with activities that are not in accordance with the learning process.

## 2. Students' Responses

Students in the three classes showed identical responses, where they responded positively to the attractiveness of the learning component. This shows that most students have a high interest in learning activities using a SETS-oriented guided inquiry model. Attention of students to learning activities and learning components is very important for the achievement of learning objectives. This is in accordance with what Bandura said, that students need to be interested in something in learning so that they can learn optimally (Moreno, 2010). Good teaching materials should attract interest and as far as possible motivate students to learn them further, so that they can develop their abilities (Toharudin, *et al.*, 2011). High attention also causes students to be interested in participating in learning activities with the *STEM* approach at the next meeting.

In this study, positive response statements were more dominant with scores of very interested and interested compared to other scores. This shows that students are motivated, interested, and have a high interest in taking part in learning. Things that make students interested in taking lessons, one of which is experimental activities. It should be noted that previous teacher learning tended to be *direct instruction* and rarely invited students to experiment. So that when this study uses experiments to find a new concept, students become happy because they get new knowledge through direct learning experiences. Thus the device used in learning is new and interesting for students and can be used as a reference for further learning.

Most of the students also felt that the learning carried out had a positive impact on their critical thinking skills. Students feel that after learning,

critical thinking skills which include the ability to interpret, analyze, *inference* (make alternative guesses and conclude) become easier to do and achieve. This is also in line with the improvement in the *pre-test* results that have been carried out. The stages of learning the SETS-oriented guided inquiry model provide opportunities for students to develop their critical thinking skills. This is consistent with research conducted by Shafarina, *et al.*, (2018), Afrianis, *et al.*, (2017) and Kisworo, *et al.*, (2018), which show that a guided inquiry learning model through SETS approach can improve skills critical thinking of learners. In addition, this study also received a positive response from students which showed that students were motivated, interested, and had a high interest in taking part in learning.

## 4. CONCLUSION

Based on the results of the research that has been done, it can be concluded that the learning devices arranged through the SETS-oriented guided inquiry model are effective for practicing critical thinking skills of students.

## 5. SUGGESTION

For other researchers who want to research using a SETS-oriented guided inquiry learning model, they should consider the shortcomings that exist in this study to anticipate things outside the plan, such as aspects of time management. This is because this model and approach requires a lot of time so that the teacher must be able to really make good use of the time. This learning device can be used by the next researcher or school teacher to practice students' critical thinking skills, but on other material studies that are in accordance with the learning model.

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