Analysis of Students Critical Thinking Ability using Models Scientific Inquiry

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Abstract. This study aims to analyze students critical thinking ability in Static Fluid material. This type of research is a quantitative descriptive study. The research subjects were students of class XI MIPA 1 in Senior High School 1 Kerajaan for the 2020/2021 academic year, totaling 30 students. Data analysis was carried out through a test of critical thinking ability in the form of description questions. The test instrument used was 7 items based on the indicators of Ennis 'critical thinking ability (1995) which had been validated by expert lecturers. From the analysis of the results of students' critical thinking ability using a model scientific inquiry In the Static Fluid material the average value was 79.52, and after being converted it was in the good category. Of the 30 students of class XI MIPA 1, 15 students (50%) have very good critical thinking ability; as many as 14 students (46.7%) have good critical thinking ability; and as many as 1 student (3.3%) had enough critical thinking ability. Thus it can be concluded that the use of the scientific inquiry model can improve the critical thinking ability of class XI MIPA 1 SMAN 1 Kerajaan students.

1. Introduction

Today's education must be directed at increasing the nation's competitiveness in order to be able to compete in global competition. One of the learning objectives is that students have the ability to think critically and creatively, and solve problems (Kemendikbud, 2016). The learning process using the 2013 Curriculum requires students to be active in learning activities, so that the learning process that occurs is student-centered while the teacher acts as a facilitator. Therefore, Physics is a means to train students in developing knowledge in the form of concepts and principles that encourage students to have the ability to think critically in an effort to achieve learning goals. The implementation of Physics learning at SMA Negeri 1 Kerajaan so far still uses conventional methods.

Based on interviews with the Physics teachers of Senior High School 1 Kerajaan in general, learning Physics in schools emphasizes the active role of teachers compared to students. The method used is generally the lecture method. In the implementation of learning the questions tested rarely require students to think critically. Teachers rarely train students to think critically to solve problems. This is based on teaching experience and an interview with one of the physics teachers of Senior High School 1 Kerajaan that students tend to prefer physics questions in the form of multiple choice rather
than description questions. Students prefer Physics questions in the form of multiple choices, because they can choose randomly selected objections if they don't know what to answer the questions asked, while the description questions will require students to think about completing it step by step. Duron (2006) explains that in the learning process it should always be emphasized that students' critical thinking ability are aimed at producing valuable learning experiences.

Learning Physics requires students to have adequate critical thinking ability. Jonny (2020) explained the importance of critical thinking ability is indicated by the large number of studies that discuss students' critical thinking ability. Nurohman (2014) explained that critical thinking in solving problems is very necessary in learning physics in schools.

Scientific inquiry learning model is expected that students are more interested and can improve students' critical thinking ability about the material presented so that the learning outcomes obtained by students also increase. Thus it is necessary to have a learning model that facilitates students to be active in learning. Scientific inquiry has very important implications for everyday classroom learning as well as for the benefit of students. This model makes the teaching process interactive and interesting.

Scientific inquiry is a learning model that brings learners to a scientific process and is assisted in collecting and analyzing data, checking hypotheses and theories, and reflecting the nature of knowledge formation so as to improve critical thinking ability. The essence of this learning model is to involve students in truly original research problems by exposing students to the field of investigation, helping students identify conceptual problems, inviting students to design ways of solving problems. Joyce, et al (2009) and Ramadani (2020) state that the essence of the Scientific inquiry learning model is to involve students in investigating real problems by exposing them to investigations.

Learning activities are said to be successful, it can be seen from the assessments made of students. The assessment used in learning activities with the Scientific inquiry learning model is the ability to think critically. The ability to think critically in Physics is a very important ability for students to solve the problems they are facing. Students' critical thinking ability can be defined as the ability to think based on available data and information to set goals.

The learning model is a plan or a pattern that is used as a guide in planning classroom learning or learning in tutorials and to find learning tools including books, films, computers, curricula and others (Joyce, et al., 2009). Furthermore, Joyce, et al stated that each learning model directs the teacher into designing learning to help students in such a way that the learning objectives are achieved. Scientific Inquiry learning model is a learning model that involves students in truly original research problems by exposing students to the field of investigation. help identify concept or methodological problems. The phases in this model are: (1) students are presented with a research field,

Critical thinking according to Ennis (1995) is thinking reasonably and reflective by emphasizing making decisions about what to believe or do. Critical thinking ability indicator Ennis (1995, there are five, namely: provide a simple explanation; building basic ability; conclude; provide further explanation; and strategy / tactics. The purpose of this study was to describe students' critical thinking ability in solving static fluid questions using the scientific inquiry learning model.

2. Research method
This type of research is descriptive research with a quantitative approach. According to Sugiyono (2019), descriptive research is used to describe or describe the data that has been collected as it is. This research was conducted at Senior High School 1 Kerajaan of Pakpak Bharat district in semester 1 (one) of the 2020/2021 school year static fluid material. The research subjects were students of class XI MIPA 1, totaling 30 students. The instrument used was the critical thinking ability developed by Ennis (1995). The question instrument used is in the form of description questions as many as 7 (seven) questions. The test instrument is given after the student receives the scientific inquiry learning model. The score for obtaining student answers is then converted to the value of critical thinking ability with the formula:
\[ Value = \frac{\text{acquisition score}}{\text{total score}} \times 100 \] (1)

The scores for each of the essay questions ranged from 0 to 4. The students' answers were then tabulated into four categories, namely: a score of 4 (very good = vg); score 3 (good = g), score 2 (enough = e), score 1 (less = l) and score 0 (very less = vl). The results of students' answers will be analyzed to determine the category of students' critical thinking ability levels, as in Table 1.

| Table 1. Categories of critical thinking ability |
|-----------------------------------------------|
| Category           | Score     |
| very good          | 81-100    |
| Good               | 61-80     |
| Enough             | 41-60     |
| Less               | 21-40     |
| very less          | 0-20      |

(Arikunto, 2003)

3. Results and Discussion

3.1 Result

3.1.1 Results of the analysis of student answers

From the analysis of students' answers to 7 (seven) items of critical thinking ability, the categories and percentages of student answers were obtained as in Table 2.

| Table 2. Categories and percentage of total student answers |
|-------------------------------------------------------------|
| Number. Test | Critical Thinking Ability Indicator | Answer category / Percentage of total students |
|--------------|-------------------------------------|-----------------------------------------------|
| 1            | Give a simple explanation           | vg 60% g 13.3% e 20% l 6.7% vl 0%          |
| 2            | Conclude                            | 36.7% 33.3% 26.7% 3.3% 0%                    |
| 3            | Strategy and tactics                | 26.7% 60% 13.3% 0% 0%                        |
| 4            | Give a simple explanation           | 40% 40% 16.7% 3.3% 0%                        |
| 5            | Build basic skills                  | 50% 30% 10% 6.7% 3.3%                        |
| 6            | Build basic skills                  | 23.3% 63.3% 10% 3.3% 0%                      |
| 7            | Provide further explanation         | 46.7% 53.3% 0% 0% 0%                         |

The graph of the answer categories and the percentage of students who answered each question item can be seen in Figure 1.
Based on the analysis of the students’ answer scores for each question item; as many as 60% of students have a very good answer category for question number 1 about why coffee beans that have been cleaned in a bucket of water will sink while the skin will float. Problem number 2, as many as 36.7% of students have a very good answer category (vg) for the concept question of the height of the point from the water surface, the pressure and distance of the water jets from the image of a mineral water bottle filled with water with four different positions of water jets. Problem number 3, as many as 26.7% of students have a very good answer category (vg) to the question of how the strategy / technique of watering flowers naturally from the given case. Question number 4 as many as 40% of students have a very good answer category (vg) to the question why if we swim in the pool, the more we dive our bodies feel the greater pressure. Question number 5 as many as 50% of students have very good answer categories (vg) for which concept questions are correct from the water jets shown. Question number 6 as many as 23.3% of students have a very good answer category (vg) to the question why a car that has a large mass can be lifted by a hydraulic jack with a force that is not too big and question number 7 as many as 46.7% of students have the answer category very good (vg) for the question of why a dam is made thicker at the bottom than the top of the image shown. Question number 5 as many as 50% of students have very good answer categories (vg) for which concept questions are correct from the water jets shown. Question number 6 as many as 23.3% of students...
have a very good answer category (vg) to the question why a car that has a large mass can be lifted by a hydraulic jack with a force that is not too big and question number 7 as many as 46.7% of students have the answer category very good (vg) for the question of why a dam is made thicker at the bottom than the top of the image shown. Question number 5 as many as 50% of students have very good answer categories (vg) for which concept questions are correct from the water jets shown. Question number 6 as many as 23.3% of students have a very good answer category (SB) to the question why a car that has a large mass can be lifted by a hydraulic jack with a force that is not too big and question number 7 as many as 46.7% of students have the answer category very good (vg) for the question of why a dam is made thicker at the bottom than the top of the image shown.

3.2. Results of Students’ Critical Thinking ability
From the 7 (seven) item description questions that were tested on students, it was obtained a picture of the average value of students’ critical thinking ability for each question, as in Table 3 below:

| Number Test | Critical Thinking Ability Indicator     | Average Value of thinking ability | Category   |
|-------------|----------------------------------------|----------------------------------|------------|
| 1           | Give a simple explanation              | 81.67                            | very good  |
| 2           | Conclude                               | 75.83                            | good       |
| 3           | Strategy and tactics                   | 78.33                            | good       |
| 4           | Give a simple explanation              | 79.17                            | good       |
| 5           | Build basic skills                     | 79.17                            | good       |
| 6           | Build basic skills                     | 76.67                            | good       |
| 7           | Provide further explanation            | 85.83                            | very good  |
| **Average** |                                        | **79.52**                        | **good**   |

The graph of the average value of students' critical thinking ability for each question indicator can be seen in Figure 2.

![Figure 2. Average Value of Students' Critical Thinking Ability](image-url)
Of the 30 students who were taught with the scientific inquiry learning model, the results of the students’ critical thinking abilities were 15 students (50%) had very good critical thinking ability; as many as 14 students (46.7%) have good critical thinking ability; and as many as 1 student (3.3%) had sufficient critical thinking ability.

3.3 Discussion
The average value of the results of critical thinking ability in class XI MIPA 1 Senior High School 1 Kerajaan which was taught using the scientific inquiry learning model is 79.52. The average value of students critical thinking ability is in the Good category [12]. This is in line with the results of research by Clarita and Sani (2019) that the scientific inquiry model can improve students’ critical thinking ability.

4. Conclusion
Based on the results of data analysis and discussion, it can be savedreiterate that the critical thinking ability of class XI MIPA 1 students of Senior High School 1 Kerajaan for the 2020/2021 academic year is 79.52, including the good category. Of the 30 students of class XI MIPA 1, 15 students (50%) have very good critical thinking ability; as many as 14 students (46.7%) have good critical thinking ability; and as many as 1 student (3.3%) had enough critical thinking ability.

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