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Profile of Critical Thinking Ability of Class VIII State Middle School Students in Science Learning

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A B S T R A C T

Students' critical thinking abilities are very necessary to shape students' cognitive strengths. This research aims to determine the profile of students' critical thinking abilities in science learning. This type of research is exploratory descriptive research with a qualitative approach. The sample for this research consisted of 124 class VIII students at SMP Negeri 10 Tapung and data collection was carried out using the test method. The critical thinking ability test refers to indicators according to Ennis which consist of 8 indicators and the results are grouped into very high, high, medium, low and very low categories. The research results showed that 19% of students were in the very low category, 57% in the low category, 23% in the medium category, 1% in the high category, and there were no students in the high critical thinking ability category. Overall, students' critical thinking skills are in the low category with an average score of 31.50. Thus, for further research it is highly hoped that a method will be implemented to improve critical thinking skills.

1. Introduction

Life in the 21st century requires someone to master various skills. Education is expected to prepare students to master these various skills so that they become successful individuals in life, ready to face various problems and challenges in life in accordance with current developments (Dulun, 2023; Alsaleh, 2020; Zubaidah, 2016). For this reason, innovation is needed in learning so that it can prepare students to face the challenges of the 21st century.

The science learning process is expected to support meeting the standards needed for graduates who are ready to face the challenges of the 21st century, namely having the ability to solve problems critically and produce creative solutions

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(Nakano, 2018; Sumarni, 2020). Therefore, critical thinking is one of the main skills needed in 21st century learning (Davies, 2015; Irwanto, 2018).

However, the facts show that Indonesia's scientific achievements are still in the low category. Referring to the results of the 2018 Program for International Student Assessment (PISA), Indonesia was ranked 74th out of 79 participating countries. The average score for the science category is 396. Even when compared with the international average score, Indonesia has quite a distance. The science category for the average international score is 489. This average score has also decreased compared to the previous PISA survey in 2015, namely 403 (OECD, 2018; OECD, 2019).

The results of the PISA survey show that the scientific literacy skills of Indonesian students are still relatively low and need to be improved. Scientific literacy skills are related to critical thinking skills. This is shown by the research results of Kusumastuti (2019) that critical thinking skills and scientific literacy abilities have a positive and significant influence with a correlation coefficient of 0.791 and a coefficient of determination of 62.6%. This means that the higher the critical thinking skills, the higher the scientific literacy skills, and vice versa. So the results of this PISA survey also show that Indonesian students' critical thinking abilities are still relatively low.

Furthermore, research conducted by Fithriyah (2016) on junior high school students also shows that students' critical thinking abilities are still relatively low. The results of this study were that of the three questions tested, only one question could be answered correctly by the students. The percentage of students who managed to answer one question correctly was only 26.92%. Apart from that, the research results of Fauziah (2020) also show the same results, namely that junior high school students' critical thinking abilities are relatively low. The average percentage scores of students from all aspects of critical thinking skills tested were only 44.87% and 36.85%.

Based on several studies that have been conducted, students' low critical thinking abilities can be caused by several factors, namely the lack of active involvement of students in learning (Ulfah, 2021), students are used to working on routine questions so they have difficulty answering the questions. high-level thinking including critical thinking (Ridho, 2020), students have difficulty connecting the concepts studied with actual phenomena (Priyadi, 2018), and students' study habits are still dominant by memorizing material so that students easily forget and are often confused in applying the knowledge they have to solve a problem (Fithriyah, 2016; Jufrida, 2020).

To overcome these problems, improvements and innovation are needed in the education system, especially through the learning process in schools. The role of teachers and the educational process is very important to develop students' potential and thinking abilities, including critical thinking skills (Akinoglu, 2015; Yennita, 2018). Teacher innovation and creativity are very necessary in presenting learning that can familiarize students with critical thinking. Such as adapting

learning to the material and students' conditions, so that learning activities can increase and students' critical thinking abilities can develop well (Agustia, 2019). For this reason, this research aims to determine the critical thinking abilities of Class VIII middle school students in science learning so that it can be used as a reference for information for conducting further research as a solution to the problem of students' critical thinking abilities.

2. Methodology

This type of research is exploratory descriptive research with a qualitative approach. This research was carried out in January, even semester of the 2021/2022 academic year and took place at SMP Negeri 10 Tapung. The sample in this study consisted of 124 class VIII students. Data collection was carried out using the test method, namely testing 16 items about critical thinking skills on students. The critical thinking ability test in this study refers to indicators according to Ennis (2001) which were selected and adapted to the abilities of junior high school students and consists of 8 indicators as shown in Table 1.

Table 1. Aspects and Indicators of Critical Thinking Ability

No	Aspects of Critical Thinking Ability	Indicators of Critical Thinking Ability
1	Provide a simple explanation	Focusing questions
		Analyze arguments
		Ask and answer questions
2	Build basic skills	Consider the credibility of the source
		Observe and consider observation reports
3	Conclude	Induce and consider the results of induction
4	Provide further explanation	Identify assumptions
5	Set strategy and tactics	Determining an action

Critical thinking ability test score data was interpreted into categories modified from percentages according to Riduwan (2015) as shown in Table 2.

Table 2. Categories of Students' Critical Thinking Ability

No	Percentage	Category
1	$80 < x \leq 100$	Very high
2	$60 < x \leq 80$	Tall
3	$40 < x \leq 60$	Currently
4	$20 < x \leq 40$	Low
5	$x \leq 20$	Very low

3. Results and Discussion

The initial critical thinking ability test questions that were tested consisted of 16 multiple choice questions on the topic of Motion and Force, which students had studied before. A description of the data from students' critical thinking ability test

results interpreted and grouped based on modified critical thinking ability categories according to Riduwan (2015) can be seen in Table 3.

Table 3. Description of Students' Critical Thinking Abilities

No	Score Range	Category	The number of students	Percentage (%)
1	80 < x ≤ 100	Very high	0	0
2	60 < x ≤ 80	Tall	1	1
3	40 < x ≤ 60	Currently	28	23
4	20 < x ≤ 40	Low	71	57
5	x ≤ 20	Very low	24	19
Total			124	100

Table 3 shows that of the 124 class VIII students, more than 50% of students are in the low and very low categories. Only 1% of students have high critical thinking skills. This means that there are still many students who have not achieved the critical thinking ability indicators. Students' critical thinking abilities for each aspect of critical thinking abilities studied are presented in Figure 1.

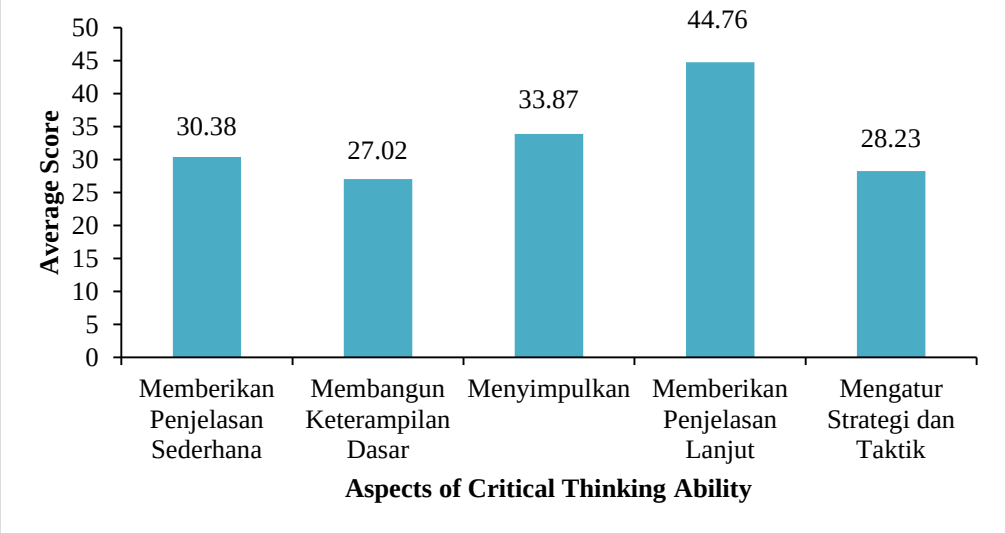

Figure 1. Students' Critical Thinking Abilities in Each Aspect

From Figure 1 it can be seen that the highest average critical thinking ability score was obtained in the aspect of providing further explanation, namely with a score of 44.76 in the medium category. Meanwhile, other aspects are in the low category. Table 4 describes students' thinking abilities for each indicator. Based on Table 4, it can be seen that almost all indicators of students' critical thinking abilities are in the low category. Only the indicator identifies assumptions that are in the medium category with a score of 44.76. Thus, an educator needs to find a solution to this problem, one of which is by practicing critical thinking skills in science learning.

Table 4. Students' Critical Thinking Ability for Each Indicator

No	Indicators of Critical Thinking Ability	Average Score	Category
1	Focusing questions	20,56	Low
2	Analyze arguments	33,87	Low
3	Ask and answer questions	36,69	Low
4	Consider the credibility of the source	20,97	Low
5	Observe and consider observation reports	33,06	Low
6	Induce and consider the results of induction	33,87	Low
7	Identify assumptions	44,76	Currently
8	Determining an action	28,23	Low

There are many ways that have been used to train and improve junior high school students' critical thinking skills in science learning, such as through Problem Based Learning or PBL (Akhdinirwanto, 2020; Pratama, 2019), Inquiry Learning (Pursitasari, 2020), Project Based Learning or PjBL (Rosiyanah, 2019), and through the integration of STEM (Science, Technology, Engineering, and Mathematics) in learning activities (Lestari, 2018; Mater, 2020).

The results of research conducted by Akhdinirwanto (2020) shows that PBL is effective in improving junior high school students' critical thinking skills with N-Gain being in the high category of 0.5. In line with this, the results of research conducted by Pratama (2019) also showed that after PBL was carried out in science learning, the percentage of students in the very high category was 11.11%, in the high category was 33.33%, and in the medium category was 55.56%.

Many studies have been conducted to determine the differences in critical thinking skills of students who were given three different learning models and it was found that the highest results of critical thinking skills were achieved by students who were given an integrated inquiry model combined with mind-maps in science learning. Research by Pursitasari (2020) also showed the same results, namely that the science context-based inquiry learning model can improve junior high school students' critical thinking skills with a medium N-Gain category.

Then, the research results of Rosiyanah et al. (2019) shows that PjBL assisted by the social networking site Edmodo is effective in improving students' critical thinking skills and learning outcomes. Critical thinking skills can also be improved by using a STEM approach in science learning. Based on research conducted by Lestari et al. (2018) found that there was an increase in students' critical thinking abilities with moderate N-Gain after learning science using a STEM approach. In line with this, the research results of Mater et al. (2020) also showed that after learning science using a STEM approach, students were able to solve real-life problems, learn complex concepts, and apply them.

4. Conclusion

From the critical thinking ability test that was taken by the students selected in this study, there were a small number of students in the very low category, almost half of the student sample was in the low category, and around a quarter of the

students were in the medium category, and only two of them who are in the high category, and there are no students with critical thinking skills in the very high category. Of the eight indicators studied, only the indicator identifying assumptions is in the medium category while the other seven indicators are in the low category. In general, it can be concluded that students' thinking abilities should be given special attention so that students have better cognitive abilities for the next educational process.

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