



## Profile of Critical Thinking of Elementary School Students and Application of HOTS-Based Worksheets in Science Lessons

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### **Abstract**

This research was conducted to analyze the profile of students' critical thinking abilities and the application of HOTS-based LKPD in elementary school science learning. The research method is descriptive preliminary research and does not test the hypothesis with a sample of 20 elementary school students in Magetan, East Java. Data collection techniques used critical thinking skills tests, student response surveys, and teacher interviews whose data results will be analyzed descriptively qualitatively. Based on the results of the research, it was found that 1) students' critical thinking skills were in the low and medium categories. 14 students in the low category, 6 students in the medium category and none of the students in the high category; 2) The lowest indicator of critical thinking skills is evaluation; 3) Teachers still use lecture methods and conventional teaching materials during learning; 4) Implementation of HOTS-based LKPD is expected to improve students' critical thinking skills in science lessons. It can be concluded that students' critical thinking skills are still low, so it is necessary to increase students' critical thinking skills by implementing HOTS-based worksheets.

**Keywords:** *Critical Thinking; Elementary School; HOTS; Worksheets*

### **Introduction**

Teachers play an important role in education in the Industrial Revolution Era 4.0. Education in the era of the industrial revolution 4.0 is directed at developing capabilities that refer to the needs of the 21<sup>st</sup> century. According to Ariyana et al (2018) 21<sup>st</sup> century learning uses the term 4C (critical thinking, communication, collaboration and creativity), are four skills that have been identified as important and necessary skills for 21<sup>st</sup> century education. The achievement of these four 4C skills is supported by the teacher's ability to develop lesson plans that contain 4C skills (Septikasari & Frasandy, 2018).

Critical thinking skills are one of the 4 skills needed in the 21st century. By thinking critically someone will not simply believe the facts around him without doing proof and trying to prove that the information is valid and can be accounted for (Julianto et al, 2023). Critical thinking skills are students' cognitive processes in systematically and specifically analyzing the problems they face, distinguishing these problems carefully and thoroughly, and identifying and analyzing information to plan problem-solving strategies (Azizah et al, 2018). Critical thinking skills in elementary school students must be developed, because critical thinking will train students to examine, analyze, and evaluate information or

opinions before deciding to accept or reject that information (Firdausi et al, 2021). Critical thinking skills have 6 indicators, namely: analysis, interpretation, inference, evaluation, explanation and self-regulation. However, the indicators of explanation and self-regulation are difficult to measure using tests, so this study only used 4 indicators (Fascione, 2011; Hasannah and Suprpto, 2021)

According to Ardiyanti and Winarti (2013: 27) the science learning process is not sufficiently carried out by conveying information about concepts, but one must also understand the process by which science occurs by sensing through demonstrations and experiments. The importance of learning science for students, of course, teachers need to design learning that is interesting for students (Mariyana, 2020; Nurroeni, 2013). Learning is a very important part in realizing quality education (Dharmayanti, 2019; Oktavia & Agustin, 2019). To support a good learning process, good preparation is needed. Not only focusing on learning methods but also learning tools, one of which is the Student Worksheet (LKPD).

LKPD as one of the teaching materials that support the learning process. Student worksheets are sheets that contain activities that can foster curiosity in students, higher-order thinking skills and this LKPD serves as a guide in completing a task based on the steps involved in learning activities and facilitates educator activities so as to achieve efficient interaction between educators and students (Nadifatinisa & Sari, 2021). Basically LKPD functions to make it easier for students to understand a learning material by minimizing the teacher's role and activating students more and in its use the teacher is responsible for monitoring student activities (Prastowo, 2012: 205).

The LKPD presented by the teacher will be better if it is integrated with 21<sup>st</sup> century skills. By developing 21<sup>st</sup> century skills in learning, it is hoped that students will have skills as provisions to face challenges in the 21<sup>st</sup> century era of progress and technology (Septikasari & Frasandy, 2018). To practice higher-order thinking skills (HOTS), teachers can train them with HOTS-based questions. The ability in question is related to critical, reflective, metacognitive, and creative thinking skills (Puspita et al, 2020).

One effort to improve students' critical thinking skills is by using HOTS-based worksheets. The LKPD used is HOTS based because critical thinking skills are a part of higher order thinking skills. The material that will be focused on the HOTS-based LKPD is Magnetism in Science lessons. This novelty is to bridge the results of previous research and obtain new findings and recommendations regarding the profile of students' critical thinking skills by implementing HOTS-based worksheets in elementary schools. Based on the explanation above, the researcher conducted a study aimed at analyzing the profile of students' critical thinking skills and the application of HOTS-based LKPD, especially in the Science of Science lesson on Magnetic Force.

## **Method**

This research is a preliminary study with data analysis techniques in the form of qualitative descriptive analysis. This research does not test the hypothesis. The results of this study will be used as material for consideration for improving learning tools in schools that are able to improve students' critical thinking skills.

This research was conducted on 20 grade 4 students at an elementary school in Magetan Regency, which consisted of 10 male students and 10 female students. The research instruments used in this study were (1) a written test on magnetic force material, (2) a student response questionnaire, and (3) a teacher interview sheet. The stages of the research were carried out as shown in Figure 1.

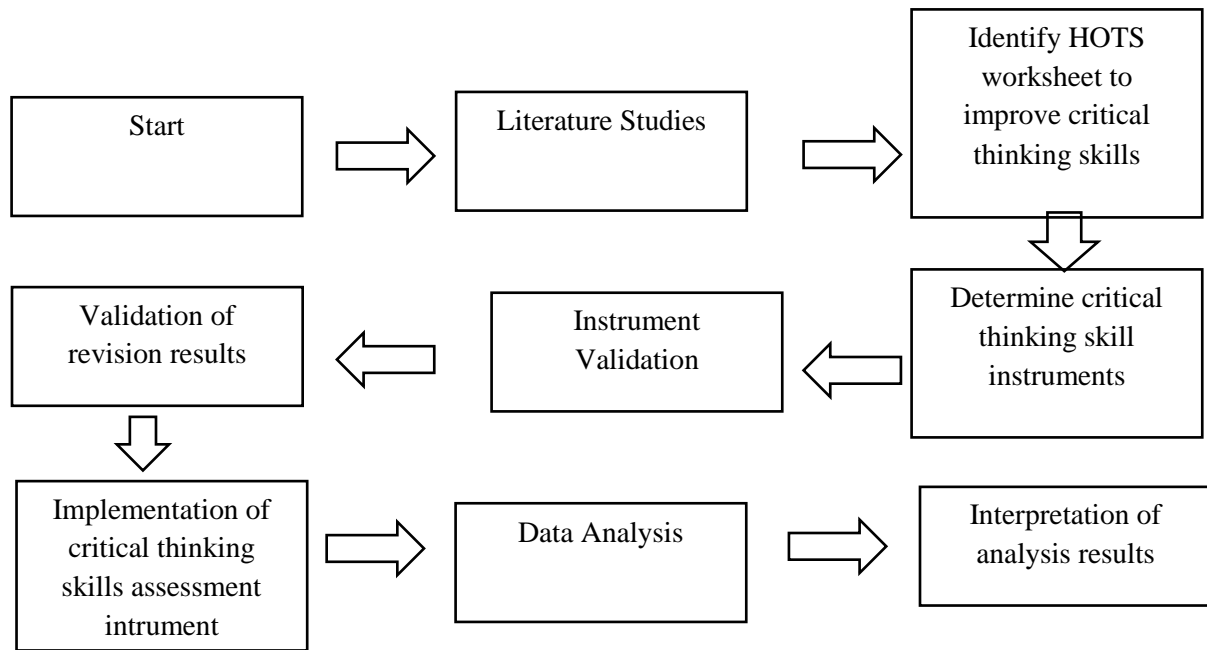


Figure 1. Research flowchart

The purpose of this study was to determine the profile of students' critical thinking skills, especially in the magnetic force material. The written test contains 8 essay questions that reflect the four main indicators of critical thinking (Facione, 2011; Hasanah and Suprpto, 2021). Furthermore, students were given a student response questionnaire for data collection (Syamsu, 2020). The teacher interview contains 5 questions that can explain conditions related to learning science at school. Then the students' critical thinking skills are calculated based on the answers to the questions given. If the answer is logical, complete and systematic, you will get 5 points; if the answer only fulfills two elements (logical and complete or logical and systematic) will get 3 points; if the answer has only one element, it only gets 1 point, and 0 points if the answer is wrong. So the maximum points are 50, and to determine the category is as follows:

Score range	Category
$75 < \text{Score} \leq 100$	Height
$45 < \text{Score} \leq 75$	Currently
$\text{Score} \leq 45$	Low

(Rohmah &amp; Prahani, 2021)

## Results and Discussion

This research was conducted to determine the level of critical thinking skills of elementary school students. The test is carried out by giving a written test which contains 8 essay test questions that are in accordance with Facione's critical thinking indicators. Critical thinking indicators used include: interpretation, analysis, inference and evaluation. Students are expected to be able to answer based on the problems presented by analyzing information, then evaluating alternative solutions in the form of statements, making conclusions from all the information and explaining in a straightforward manner the solutions to the problems they find (Sunarti et al., 2021). It was from the students' answers that the researcher could assess the level of students' critical thinking skills. Based on the research that has been done, the results of students' critical thinking skills are obtained in the Style material using the Facione indicator as shown in Figure 2.

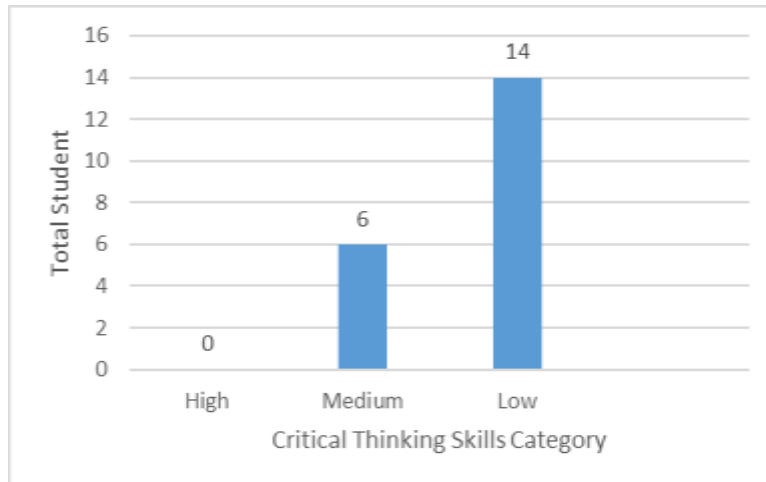


Figure 2. Categories of Critical Thinking Skills

Figure 2 is obtained from 20 students as a whole, 6 students in the medium category and 14 students in the low category. Uniquely there are no students who fall into the high category. The difference in the number of students was significant between the categories of moderate and low critical thinking skills. Figure 2 proves that the most common is the category of low critical thinking skills, this is in line with research by Purwanto et al, (2022).

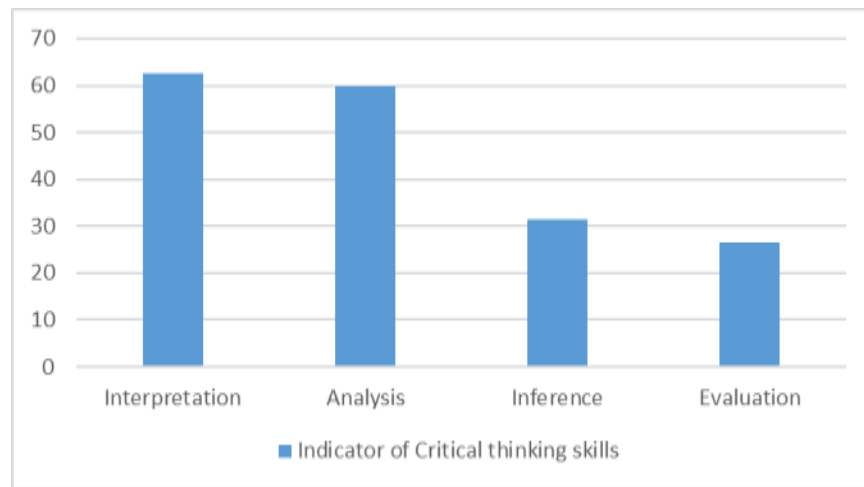


Figure 3. The average of each indicator of critical thinking skills

Figure 3 shows the results of the average indicators of students' critical thinking skills in one class. Based on the picture, it can be seen that the highest average critical thinking indicator is an interpretation indicator which shows that students can give opinions that are appropriate to the problems presented. The second highest average, which differs slightly from interpretation, is an analytical indicator. This shows that students are able to analyze the type of style that fits the problem presented. While the third and fourth ranks, namely inference and evaluation, are still low. So it can be seen that students have not been able to conclude and evaluate the problems presented in the questions. The examples of student questions and answers in the critical thinking skills test are as follows:

## 1. Interpretation

- a. Dari permasalahan yang dialami Aga dan Dara, berikan interpretasi (pendapat) tentang bagaimana cara memindahkan kontainer tersebut! *aga dan dara harus menggunakan gaya otot*

Figure 4. Interpretation of student answers

Figure 4 is the answer to the question of interpretation indicators, students are asked to interpret their understanding of the problems presented. That is about how to move heavy containers. However, the students' answers were not correct in understanding the style. The correct answer should be raised together. Because in the question the problem was presented that the container was very heavy so Dara asked Aga's help to help move it. The students' answers that Aga and Dara had to perform muscle movements were still ambiguous. Releasing muscle force in what form is not explained.

## 2. Analysis

- b. Berdasarkan Interpretasi (pendapat) yang kalian temukan, analisislah gaya apa yang digunakan untuk memindahkan Kontainer! *gaya gesek*

Figure 5. Analysis student answers

Figure 5 is the answer to the analysis indicator question. Based on the answers to the previous questions, students were asked to analyze what style was used to solve Aga and Dara's problems in moving containers. But the student's answer is still not right. Students answered with a frictional force, even though in the previous question in part a the students answered using a muscular force. This shows that students still do not understand and cannot analyze based on the problems presented.

## 3. Inference

- c. Dari hasil analisis tersebut, buatlah sebuah inferensi (simpulan) terkait hal-hal yang ada pada permasalahan ini! Lalu buatlah desain alat bantu atau ide untuk memudahkan serta meringankan Dara dan Aga saat memindahkan Kontainer lagi! *di angkat*

Figure 6. Inference indicator student answers

Figure 6 is the student's answer to the inference indicator (conclusion). Students are asked to understand and conclude regarding matters relating to the problems presented. Then they were asked to make tools or ideas to make it easier for Dara and Aga to move the containers. However, the students' answers still did not bring up a conclusion, and most of the students had not been able to come up with ideas to make it easier to move the container. The conclusion from the problems presented above is that by using the muscle force Dara and Aga can lift and move containers together. And the idea to make it easier to move the container is to provide wheels at each corner of the container.

## 4. Evaluation

- d. Setelah menarik simpulan, buatlah sebuah evaluasi terkait jawaban yang sudah kamu jelaskan! *harus di angkat*

Figure 7. Students' answers to evaluation indicators

Figure 7 shows a representation of students' answers to the evaluation indicators. Students are asked to make an evaluation of the conclusions that have been made. From the conclusions in the previous problem, it can be evaluated that to make it easier to move the container, apart from being lifted

together using muscle force, you can also install wheels at each corner of the container. However, because students are still having difficulty in the stage of making conclusions, so that it has an impact on evaluation. Most of the students still have difficulty evaluating their own answers.

### Results of Student Responses to Science Learning

After working on the critical thinking skills test, students were asked to fill in their responses to learning science at school. This response amounted to ten statements with the answer choices of strongly disagree, disagree, agree and strongly agree. The results of student responses are represented in the following table:

No	Statement	Strongly Disagree	Don't agree	Agree	Strongly agree
1	IPAs is a fun lesson	0 (0)	33.3 (7)	47.6 (10)	14.3 (3)
2	The Material Style Around Us is important to understand	19.0 (4)	14.3 (3)	33.3 (7)	28.6 (6)
3	The Material Style Surrounding Us is difficult to comprehend	19.0 (4)	42.9 (9)	28.6 (6)	4.8 (1)
4	Learning that is often used by teachers in class is more the lecture method than the experimental/practicum method	9.5 (2)	42.3 (9)	38.1 (8)	4.8 (1)
5	I feel happy with the teaching method used by the teacher in the current class			66.67 (14)	28.6 (6)
6	I am often trained in critical thinking skills	14.3 (3)	52.4 (11)	23.8 (5)	4.8 (1)
7	Critical thinking skills are important to be taught in schools	9.5 (2)	23.8 (5)	33.3 (7)	28.6 (6)
8	I know what LKPD is	19.0 (4)	9.5 (2)	47.6 (10)	19.0 (4)
9	I have learned to use worksheets with higher order thinking skills	4.8 (1)	47.6 (10)	19.0 (4)	23.8 (5)
10	I am interested in getting learning using LKPD with higher order thinking skills		14.3 (3)	61.9 (13)	19.0 (4)

In table 2 the student responses show that most students agree that science is a fun lesson and think that style material is important to understand even though there are some students who experience difficulties. Students agree that the teaching method used by the teacher in class is more lecture method than experiment. However, students feel happy with the learning method used by the teacher in the

current class. Students are rarely trained in critical thinking skills, but students agree that critical thinking skills are important to be taught in schools. Most students already know LKPD but there are still a few students who learn to use LKPD with higher order thinking skills. At the next point, students are interested in getting learning using LKPD with high-order thinking skills or also known as HOTS (Higher Order Thinking Skill) based.

### **Results of Interviews with Grade 4 Teachers**

After interviewing the fourth grade teachers, it was found that most were interested and interested in science lessons in class. Teachers have started to implement independent learning in teaching science concepts to students, but it is not optimal, because they have just implemented it so there are still many shortcomings. The limitations experienced by teachers while teaching science concepts to students are material that is slightly different from the previous curriculum, and students' initial understanding is different. Books and references about independent learning are still limited, so that in learning the teacher uses the lecture method combined with experimentation. But the portion for doing practicum is still small. As with material styles, there are various types of styles. And some styles are taught by experimental methods using LKPD prepared by the teacher. However, the LKPD prepared by the teacher was limited to what was in the student's package book. So that it is only limited to answering questions whose answers can be found in textbooks, it does not encourage students to think critically.

According to the teacher critical thinking skills are important to develop. Because it is not only a matter of learning, but in dealing with the problems of everyday life critical thinking skills are needed. The teacher says critical thinking skills can be developed by stimulating students with questions about problems that exist around students, then asking them to find solutions to these problems. The teacher already knows about LKPD HOTS, but has never used it in learning. This was because the teachers felt that the LKPD they bought or those in the textbooks were more practical, considering that there were also teachers who also served as school operators, BOS treasurers, extracurricular administrators and other administrative duties. Plus the lack of teacher knowledge in making LKPD. So that makes LKPD still find it difficult.

The results of the interviews prove that science learning in schools, especially in the style material, is still carried out using the LKPD in the textbook or purchased. There is no special treatment from the teacher to improve students' critical thinking skills. Of course this will affect students' attitudes, motivation, and interest in learning natural sciences at school. Many studies have been conducted to understand the impact of using HOTS LKPD.

### **Conclusion**

Based on the research results from the findings and data analysis above, it can be concluded that students' critical thinking skills are still low. The lowest critical thinking indicator is in the evaluation and the indicator that has the highest value is in the interpretation. This study also aims at surveys and tests with indicators of critical thinking skills, that these critical thinking skills must be trained in students by educators, especially in style material. In this study it was also found that schools still use conventional teaching materials and are not integrated with HOTS. In this research it is known that students' critical thinking skills can be influenced by appropriate teaching materials in science learning. One effort that can be used to improve students' critical thinking skills is to apply HOTS-based worksheets.

### **Recommendation**

Future research is expected to be able to use teaching materials that are more innovative, according to the interests and needs of students such as HOTS-based worksheets.

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