STUDENTS' CRITICAL THINKING SKILLS IN SOLVING PISA-TYPE MATH PROBLEMS IN THE CONTEXT OF FERRIS WHEELS

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ABSTRACT
This study aims to describe students' critical thinking skills in solving PISA-type mathematics problems in the context of the Ferris wheel at SMP IT Izzuddin Palembang. This study is a descriptive study with a qualitative approach and was carried out face-to-face, with the subjects of the study being 22 students of class VIII. 2 Halimah SMP IT Izzuddin Palembang. Data collection techniques used written tests and interviews. Based on the results of the analysis and discussion that have been carried out, students' critical thinking skills are in the low category with an average score of 40.54. Based on the percentage of achievement of critical thinking ability indicators, there are several indicators that often appear, namely the analysis indicator 68% and the indicator that appears the least is the inference indicator 4%.
Keywords: *Critical Thinking Skills, PISA, Ferris Wheel*

A. INTRODUCTION

One of the important skills that every student must have is critical thinking. According to the Ministry of Education and Culture 2020, in the 21st century there are 6 skills that students must have, namely 6Cs, Critical, Creativity, Character, Collaboration, Communication, and Citizenship. According to Susilowati (2022) in the journal (Atikarani, 2022), independent learning is a curriculum provided to students so that they can understand their interests and talents, enabling them to think critically and creatively. Critical thinking skills are considered important and necessary for training students to solve problems they rarely encounter, so that by getting used to this, students will become accustomed to dealing with problems that are difficult to solve.

The questions used to measure critical thinking skills are HOTS questions. According to Priantoro Dwi Kristanto et al 2020, HOTS questions are related to existing facts, analysis, determining hypotheses, explanations, and conclusions. Similar HOTS questions are used in PISA to improve critical thinking skills. According to the OECD (2019), the PISA process involves seven important aspects, namely: (1) Communication; (2) Mathematizing; (3) Representation; (4) Reasoning and Argument; (5) Devising Strategies for Solving Problems; (6) Using Symbolic, Formal, and Technical Language and Operations; and (7) Using Mathematical Tools. According to Idhom 2020 in the journal Anifaruzki Amalia et al 2021, the questions used in Indonesia have a lower level of difficulty than PISA. According to Setyaningsih & Munawaroh 2022 in the journal Arvin Efriani et al 2024, PISA has several contents, namely space and shape, change and ratio, magnitude and uncertainty, and data. The PISA test questions used by researchers are from the Space and Shape content. According to Arvin Efriani et al 2024, based on the 2018 PISA assessment of student performance, 15-year-old children in Indonesia scored 379, while the OECD average score was 489. From this, it can be seen that students in Indonesia ranked 73rd in mathematics and

77th in the PISA assessment. It can be concluded that Indonesia ranks 5th from the bottom in the PISA assessment, namely mathematics. Therefore, it is very important to familiarize students with PISA questions so that they can practice critical thinking skills and students from Indonesia can achieve average or even above-average scores on the PISA test.

PMRI is an approach that uses real-world contexts to make it easier for students to understand the problems given. PMRI is a habituation to students in recognizing the surrounding environment related to mathematics, so that students are accustomed to working on problems that have context in life. According to Dewi and Agustika 2020 in the journal (Atikarani 2022) one way that can be done in learning to make it easier for students to connect abstract mathematics with real problems is to use the PMRI approach. According to Fauziah Putri et al 2020 in the journal (Anna Fauziah 2022), PMRI is adapted from RME which is adapted to the context in Indonesia and culture in Indonesia. With the context of the PISA problem in this study, in this case the researcher took the context of the Ferris wheel, which is often used, it will be easier for students to find ideas in solving PISA problems.

Research on PISA questions with various contexts, namely Malemang Muara Enim Context (Arbella Sri Marleny et al 2024), Palembang Tourism Context (Uswatun Hasanah et al 2023), South Sumatra Traditional Culinary Context (Muslimin et al 2022), and Guava Fruit Context (Dwi Rahmadona et al 2021).

Based on the description of the background and previous research, this research has novelty, namely content, context, and research subjects. Researchers are interested in conducting research on the Critical Thinking Ability of Students in solving PISA-Type Mathematics Problems in the Ferris Wheel Context.

B. METODE PENELITIAN

This research uses descriptive qualitative research which aims to describe the critical thinking skills of students in solving PISA-type mathematics problems in the context of Bianglala. This research was conducted at SMP IT Izzuddin Palembang and the targets were students of class VIII.2 Halimah who were 22 students. The research instruments include Teaching Modules, lesson plans, LKPD, PISA Test Questions, and Interview Guidelines.

The data collection techniques used are tests and interviews. The test was done by students offline and the interview was conducted after the test which was used to question the test questions that had been carried out by students.

After collecting data from the PISA written test and interviews. Furthermore, the data analysis technique is data reduction to see the critical thinking ability of students in solving PISA-type mathematical problems in the context of the Ferris wheel in terms of student answer indicators and the results of interviews with research subjects. After that, presenting the data in a descriptive way to make it easier to understand. Next is drawing conclusions that have been obtained from data reduction and data presentation.

The indicators of critical thinking skills are as follows:

Table 1: Indicators of Critical Thinking Ability

Indicator	Descriptor
Interpretation	Can find some information in the problem
Analisis	can outline a solution strategy for the problem
Evaluasi	Can apply the solution strategy precisely to the problem

| Inferensi | Can draw conclusions on the problem |

C. RESULTS AND DISCUSSION

In the research conducted, students were asked to work on PISA-type math problems on the content of Space and Shape. The question is adapted from the PISA question and has been validated by validators who are experts in their fields. The form of the problem done by students is as follows.

Soal 1

Bianglala di Citra Land Palembang memiliki diameter 30 meter dan 18 gondola berputar satu putaran penuh dalam waktu 7 menit.

1. Hitunglah besar sudut yang ditempuh oleh gondola setiap menit?
Jawab :

2. Hitunglah luas juring yang dibentuk antara dua gondola yang bertetangga?
Jawab :

Figure 1: Adaptation of PISA test questions

In the problem above, part 1 students are asked to calculate the angle traveled by the gondola every minute from the G-Walk Ferris wheel, while part 2 students are asked to calculate the area of the radius formed between two neighboring gondolas from the G-Walk Ferris wheel. This question was done by 22 students in 1 class. The following is the frequency of students according to the critical thinking ability indicators.

Table 2. Frequency of Students Who Met the Indicators of Critical Thinking Ability

Indicator	Question a	b	Average number of students who meet the indicator	Persentase
1	21	5	13	59,09%
2	20	19	20	90,91%
3	20	16	18	81,82%

D. CONCLUSION

In conclusion, it should be able to answer the research questions. Some suggestions related to the results can be added. This conclusion and recommendation contain the findings from the conducted research.

Based on the table above, the percentages that fulfill the Interpretation, Analysis,

Evaluation, Inference indicators are 59.09%, 90.91%, 81.82%, and 4.55% respectively. After obtaining the frequency of students in the critical thinking ability indicators, the researcher categorized the critical thinking ability in classifying students as follows.

Table 3. Categories of Critical Thinking Ability

Value	Student Ability	Number of students
76-100	High	2
53-75	Currently	2
0-52	Rendah	18

Based on the results of the test questions that have been carried out, researchers obtained students who have critical thinking skills as follows: High ability (2 students), medium ability (2 students), and low ability (18 students). The average critical thinking ability of students in solving PISA-type mathematics problems in the context of Ferris wheel is low.

The answer results from subject SA (High ability student).
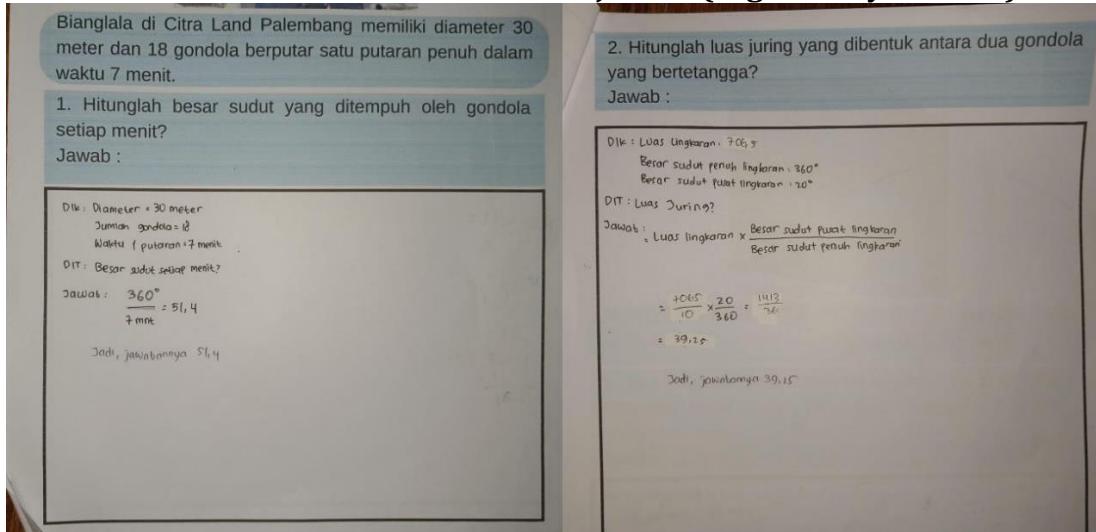
Figure 2. Results of SA's Answer

Based on the answers to the test questions that have been worked on, subject SA is a student with a high ability category. During learning SA is very active in asking questions, discussing with groups and enthusiastic in working on the LKPD given. Then, judging from the work on the test questions, Subject SA has fulfilled the indicators of critical thinking ability. However, there is still symbol writing that has not been made and reinforced by interviews conducted by researchers. The following are excerpts of interviews with SA subjects.

P : What is known in the problem?

    SA : The diameter is 30 meters, the number of gondolas is 18 gondolas, and the time for 1 full rotation is 7 minutes.

    P : What is asked in the question?

    SA: Problem part 1 is looking for the size of the angle every minute and part 2 is looking for the area of the juring formed between two neighboring gondolas.

    P : What strategy do you use to solve the problem?

    SA: In part 1 I use the angle of 1 full rotation of 360 ° divided by the time of one full rotation of 7 minutes so that I get the result which is 51.4 °. In part 2 I looked for the area and size of the central angle then entered the juring area formula and did the work so that I got 39.2 m2.

    P : Why when working on SA problems do not make symbols and when in the interview mention symbols?

SA: Because at the time of the work forgot to make it P: What is the conclusion obtained?

SA: So the angle of each minute is 51.4 ° and the juring area formed by the neighboring gondola is 39.2 m2.

Based on the interview excerpts conducted, subject SA was able to explain each question asked and was able to provide support for the answers given. In addition, the SA subject completes the given problem well, has the right conclusion and can be understood, and can be validated.

Answer Result of FN (Medium ability student)
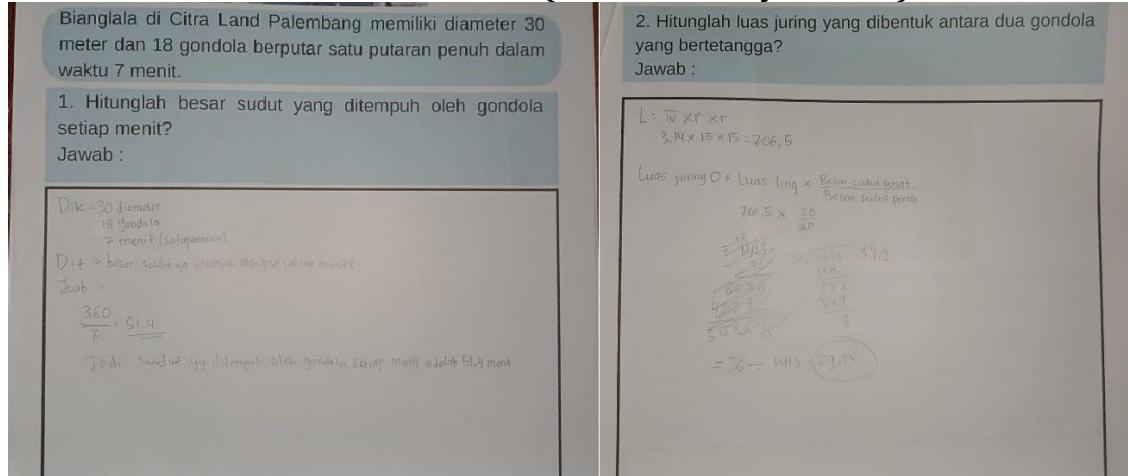
Figure 3. Answers of subject FN

Based on the answers to the test questions that have been done, subject FN is a student in the medium category. During learning, he was quite active, but when discussing with groups in working on LKPD, he was still less involved. Subject FN answered the test questions well enough, but there were still mistakes in making symbols and did not conclude the results obtained. Subject FN

P : What is known in the problem?

FN : Diameter, Time of one revolution, and number of gondolas. P : What is asked in the question?

FN : The angle every minute and the area of the radius P : What is the conclusion from answer 1?

FN : So the angle traveled is 51.4 minutes P : 51.4 minutes?

FN: 51.4° every minute is enough to fulfill the indicator of critical thinking ability.

The following are excerpts of the researcher's interview with subject FN.

Based on the interview excerpts, subject FN still made mistakes in making symbols and in part 2 did not make conclusions. However, subject FN can identify the information in the problem and can explain the conclusion in part 1 correctly during the interview.

NA Answer Result (Medium ability student)
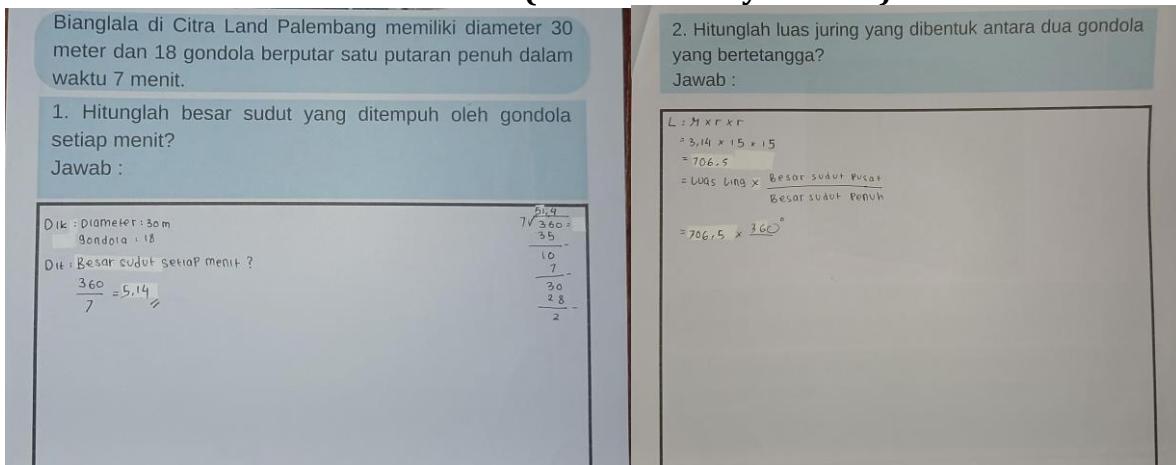
Figure 3. Answers of subject NA

Based on the answers to the test questions that have been done, subject NA is categorized as low ability. During class, subject NA was less active and during group discussions in working on LKPD was not enthusiastic. In the results of the answers to the test questions that were done, NA did not seem to understand the problems. Subject NA only completed part 1 and did a little of part 2, but only wrote down the strategy and did not work on the results and conclusions. NA subjects only fulfill some indicators of critical thinking skills. The following are excerpts of interviews conducted by researchers with NA subjects.

P : What is known in the problem?

NA : Diameter and number of gondolas

P : What is asked in the question?

NA : The magnitude of the angle P : Why don't you continue with part 2 until the conclusion?

NA : Based on the interview excerpts above, Subject NA seemed to still not understand the problem and only knew some information. While in solving the problem there is still something that is not correct and does not reach the results and conclusions.

E. CONCLUSIONS

Based on the results of the research and discussion of the Critical Thinking Ability of Students in Solving PISA-Type Mathematics Problems in the Ferris Wheel Context with 3 categorizations, namely high ability, medium ability, and low ability, and assessment based on 4 indicators, namely Interpretation, Analysis, Evaluation, and Inference that the author has described above, it can be concluded that students are still categorized as low ability. There is an indicator that often appears, namely Analysis and the least appeared is Inference. Students still have difficulty in solving problems because they are less careful and thorough. So that students do the problem not in accordance with what is asked.

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