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DESCRIPTION OF STUDENTS' CRITICAL THINKING ABILITIES IN SOLVING TIMSS QUESTIONS IN GRADE VIII OF SMPN 3 BARRU, BARRU DISTRICT

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ABSTRACT

students' critical thinking skills in completing TIMSS questions in students class VIII are still lacking so the researchers took the initiative to describe students' critical thinking skills. This research aimed to describe the critical thinking skills of students in completing TIMSS questions in class VIII of SMPN 3 Barru, in the high, medium and low categories. The method of this research is descriptive qualitative research. The data collection was carried out through students' critical thinking skills tests and interview guidelines. All VIII grade students of SMPN 3 Barru were given a test of students' critical thinking skills in the form of TIMSS questions. Data regarding students' critical thinking skills were then triangulated with interview data. 3 students consisting of 1 high, medium and low ability students. to be interviewed. Furthermore, the analysis of all data is carried out with the following steps: the data reduction stage, the data presentation stage and the conclusion drawing stage. The results showed that: 1 high category subject met the indicator of students' critical thinking skills in completing TIMSS questions by answering all the test questions given. Subjects identify well and understand the purpose of the problem given is able to provide further explanation because the subject is able to identify the definition of the problem and provide information about how to get the essence of solving the problem. Two subjects in the moderate category were not able to meet all the indicators of students' critical thinking skills on the TIMSS test sheet but were able to provide what information was known and what was asked based on the questions they had done. The information provided at the interview was the same as what was written on the sheet. tests and subjects are able to identify definitions of questions. Three subjects in the low category have not been able to explain the purpose of their writing, the subject is also not qualified to work on problems as given.

Keywords: Critical Thinking, Descriptive Qualitative Research, TIMSS

INTRODUCTION

The importance of critical thinking in mathematics learning is emphasized by the government by establishing mastery of thinking skills as one of the standards for passing mathematics. The Ministry of National Education 2006: 361 (Sulistiani Eny, 2016: 606) states that developing critical thinking skills is the focus of learning and is one of the standards for junior high and senior high school students. Junior high and senior high school graduates have the ability to think logically, analytically, systematically, critically and creatively, and have the ability to work together. However, in reality, the implementation of mathematics learning in schools has not fully trained students' critical thinking skills. The existence of student weaknesses in solving mathematics problems is influenced by the level of each student's mathematical ability. Students with low mathematical abilities may have more weaknesses than students with high mathematical abilities. As a result, each student's thought process in solving mathematics problems also differs depending on their level of mathematical ability.

Indonesia's achievement in TIMSS 2011 which was participated by 42 countries identified that the critical thinking ability of Indonesian students was still less than satisfactory, Indonesia's position was ranked 38th with a score of 386 points, the score was below the average international mathematics achievement score of 500 points Muhlis, et al.,

2012 (Pribadi Abdi, et al., 2017). In 2015 Indonesia again participated in TIMSS which was participated by 50 participating countries, Indonesia's mathematics achievement was ranked 45th with a score of 397 points Rahmawati, 2015 (Pribadi Adi, et al., 2017: 115).

Siti Fatimah, 2012 (Pribadi Abdi, et al., 2017: 115-116) stated that Indonesia's low achievement in TIMSS(*Trends International Mathematics and Science Study)*This is caused by several factors, one of which is that the questions given to students in international competitions are different from the questions usually given to most students in Indonesia.

Based on observations that have been made when the mathematics subject teacher provides learning and gives questions to students, students are still less able to solve the questions well, this is clarified by the subject teacher that in solving mathematics problems it still needs to be improved so that the critical thinking skills that students have in solving TIMSS questions are still lacking.One reason is that in mathematics learning, teachers generally focus too much on procedural and mechanistic problem-solving exercises. As a result, some of the contexts used in TIMSS problems are unfamiliar to students.

With these problems, the author was motivated to conduct research to analyze students' critical thinking skills in solving mathematics problems in the form of TIMSS.(Trends in International Mathematics and Science Study)with the research title "Description of Students' Critical Thinking Skills in Solving TIMSS Questions in Class VIII of SMPN 3 Barru, Barru Regency".The purpose of this study is to describe the critical thinking skills of high, medium, and low-category students in solving TIMSS questions. Critical thinking skills are a process of using thinking skills effectively to help someone create, evaluate, and apply decisions in accordance with what is believed or done. Some thinking skills related to critical thinking are comparing, differentiating, estimating, drawing conclusions, influencing, generalizing, specializing, classifying, grouping, sorting, predicting, validating, proving, connecting, analyzing, evaluating, and creating patterns (Siswono, TYE 2018: 7).

According to Siswono, TYE (2018: 11), one approach that can be used to improve students' critical thinking skills is to create a classroom atmosphere that makes students feel comfortable questioning, challenging, suspending judgment, and demanding reasons and justifications as they encounter real-world and mathematical content. Ask questions that stimulate students to monitor, evaluate, and act on their own thinking.

According to Ennis (inLestari Kurnia Eka & Yudhanegara Mokhammad Ridwan, 2018)The indicators of students' critical thinking abilities are as follows:

1. Provide a simple explanation
   - Focusing questions
   - Get to know the content of the argument
   - Asking and answering questions
2. Building basic skills
   - Consider whether the source is reliable or not
   - Observing and considering observation reports
3. Make a conclusion
   - Deduct and consider the results of the deduction
   - Inducing and considering the results of induction
   - Create and determine the results of considerations

4. Make further explanations
   - Identify terms and consider a definition
   - Identifying assumptions
5. Set strategies and techniques
   - Determining an action
   - Interact with others

Research methods

This research is a qualitative research with a descriptive approach, which describes everything related to the critical thinking process of students in solving TIMSS (Trend International Mathematics And Science Study) problems. This research will be conducted at SMPN 3 Barru. The subjects of this study are students of class VIII of SMPN 3 Barru, the steps for selecting subjects in this study, namely determining the research class, giving students tests in the form of TIMSS (Trend International Mathematics And Science Study) questions to identify students' critical thinking abilities, after giving the test, 3 students were selected from the selected class, each with 1 high, medium and low ability student. The main instrument in qualitative research is the researcher himself, test sheets and interview guidelines as supporting instruments. Data collection techniques used in this study are test techniques and interview techniques. The data analysis process that will be used is the Miles and Huberman model (Sugiyono. 2017: 337) which is carried out with steps namely data reduction, presentation and drawing conclusions.

Research result

The research results obtained by the author are the results based on the administration of TIMSS tests to eighth-grade students of SMPN 3 Barru and these results are strengthened by the implementation of interviews with subjects who have been selected based on high, medium, and low categories. The following is the total number of students from 3 classes who took the test based on their abilities. Categorization is based on the Minimum Completion Criteria (KKM) of eighth-grade students of SMPN 3 Barru.

Table 1 Categories of Student Ability Levels

Ability Level	Value Range	Number of Students
Tall	86-100	16
Currently	75-85	35
Low	0-74	27

To facilitate data analysis, researchers assigned codes to interviewers and research subjects. The interviewer code in the transcript was given the code P, followed by a single digit indicating the question number, followed by a period and two digits after the period indicating the order of questions for one subject. For example, the first question for subject one was "P1.01." Meanwhile, the code for the subject's answer excerpts began with the

subject's initials, such as "HN." Then, followed by three digits, the third digit indicates the subject's order, and the last two digits indicate the order of the answer excerpts for each question. For example, the answer excerpt "HN1-02" indicates the second answer excerpt by subject one, Hilmi Nabila.

DISCUSSION

1. Students' critical thinking skills in solving TIMSS high category questions in the subject of HN

Based on the results of the tests and interviews that have been carried out, the author discusses the research results obtained based on indicators of critical thinking skills. Where it can be seen from the results of the HN interview regarding the 3 (questions) it can be said that the subject HN is able to provide a simple explanation because in the process of working on the test on question number 1 (one) the subject wrote the steps used completely so that it makes it easier for the subject to solve the question, namely, HN wrote what is known in the question, namely, the materials for making stick toy cars are 27, leather for the body is 19 and leather for tires is 30. This is also proven by the results of the interview with the subject, namely HN1.03. While on question number 2 (two) shows that the subject considers the answers obtained by solving the questions with steps that are well understood by the subject HN so that the answers obtained can be proven true. able to identify questions well, explain the meaning of the questions that have been given, answer questions according to their thinking abilities.

In the indicator of building basic skills, information was obtained based on the results of the interview that the subject HN understood the meaning of the question by writing what was known and asked correctly using his own sentences, to find out the information in the question the subject also gave consideration that in solving the question it is better to write down the steps for solving it as shown in the picture in indicator 1 (one). This means that the subject is able to observe and consider the results of the observation.

The indicator for drawing conclusions can be used to obtain information based on the test results for question number 2 (two) and the results of interviews that have been conducted, namely by multiplying numbers sequentially. HN provides a conclusion on how to solve the problem.

The results of the test and interview of the high category HN subject that had been carried out by the HN subject were able to solve the problem correctly. It was revealed that to continue the number pattern up to the 12th term is by counting backwards which if subtracted by 1 will result in 99 and if added by 1 will result in 100 and so on. HN also found the right number to form the correct pattern. HN revealed that the number pattern is an orderly arrangement of numbers or numbers so that it forms a pattern. This HN is said to be able to provide further explanation based on the results of the HN3.16 and HN3.18 subject interviews on question number 3 (three). The HN subject also identified the definition of the problem providing information on how to get the core of solving the problem. Students' critical thinking abilities based on the results of tests and interviews that include indicators of students' critical thinking abilities in the high category, the HN subject experienced a process of identifying assumptions by translating them into his own language in providing an explanation of the given problem. In the indicator for making further explanations, it is stated that subject HN provides an explanation that in solving

problems, the subject explains how to get the answer in his own way based on what he knows and expresses ideas about the problem-solving steps that will be used to carry out the solution.

In the indicator of arranging strategies and techniques, subject HN explained that to solve the problem, the subject arranged a solution plan by writing down what was known from the problem and what was asked and solving the problem based on what was asked on the test sheet. Rahmawati Nita Dewi, 2014: 84 stated in her research results that by writing down what was known and asked, they did not need to review the problem and because they often wrote down the formula in the solution plan, it made it easier for them to remember the formula. This subject was also able to apply the steps used to solve the problem on the test sheet and do calculations more carefully. The subject also explained that to get the answer to the problem, it was necessary to divide each existing material and to produce a toy car, 3 sticks were needed, 2 skins for the body and 4 skins for the tires, so that based on the existing materials, 7 (seven) toy cars could be produced.

2. Students' critical thinking skills in solving TIMSS questions in the medium category of the NL subject

Based on the results of the tests and interviews that have been conducted, the author discusses the research results obtained based on indicators of critical thinking skills. Subject NL was able to provide information on what was known and what was asked based on the questions he had worked on. The information provided during the interview was the same as what had been written on the test sheet. Therefore, in this case, subject NL is said to be able to provide simple explanations. The subject also worked on the questions based on the method the subject usually works on, although the form of the previous questions was not the same as the one that had been given, subject NL was able to answer the questions in his own way.

In the basic skills building indicator, subject NL wrote down what was known in the question, but during the interview, subject NL was not yet able to explain the purpose and purpose of why the subject wrote the data. Therefore, in this question, subject NL is still lacking in building basic skills. However, in question number 2 (two), subject NL solved the problem by multiplying the numbers in a row, considering that the multiplied numbers are the highest result.

In the conclusion-making indicator, subject NL provided information about how much material was needed to make a toy car, but subject NL did not write it on the test sheet because the subject forgot to write it. Subject NL also answered the question by multiplying all the numbers and then determining the highest product as the correct answer to the question. Subject NL was not yet able to provide information regarding why the subject multiplied the numbers. Therefore, in this case, subject NL was categorized as still less able to draw conclusions.

Based on the test results and interviews with NL subjects in the moderate category, the subjects identified a definition of number patterns using their own language, although the definition presented by the subjects was not complete, but the subjects had tried to provide information about what was asked by the researcher. Based on the indicator of arranging strategies and techniques, in this case, NL subjects in the moderate category in the interview, the subjects provided explanations and determined the steps used

in answering questions by reducing each number by 1 (one) to form a pattern up to the 12th pattern. However, the explanation of the subjects was said to have not been able to organize strategies and techniques well.

3. **Students' critical thinking skills in solving TIMSS questions in the Low category of the MH subject**

Based on the interview results, subject MH was able to provide information about what was known and what was asked based on the questions he had worked on. The information provided during the interview matched what had been written on the test sheet. Based on the interview results, subject HM worked on the questions based on the question format on the test sheet. The subject also multiplied all the numbers to get the most appropriate answer according to him.

Based on the interview results, subject MH wrote what was known in the question, but during the interview, subject MH was not yet able to explain the meaning of his writing, and the subject also did not often work on questions as given. So in this case, subject MH is still lacking in building basic skills. Based on the test results and interviews with subject MH regarding the indicators for building basic skills, subject MH solved the problem by multiplying numbers in a row with the consideration that the multiplied number is the highest result. This means that subject MH is able to fulfill the indicator considering whether the source is reliable or not.

Based on the interview results, subject MH provided information about how many materials were available to make the toy cars, but the subject was not yet able to answer the questions correctly. Based on the test results and interviews with subject MH in the moderate category, subject MH answered the questions by multiplying all the numbers and then determining the highest product as the correct answer to the question. Subject MH was not yet able to provide information regarding why the subject multiplied the numbers. So in this case, subject MH was categorized as still less able to draw conclusions.

Based on the test results and interviews with the MH subjects in the moderate category, the subjects identified a definition of number patterns using their own language, although the definition presented by the subjects was not complete, but the subjects had tried to provide information.

Based on the interview results, subject MH was unsure about the answers he had written on the test sheet. He also had no other way to answer the questions other than what he had written. Based on the test and interview results, subject MH was categorized as moderate, meaning he was unable to explain how to solve the questions.

Closing

Based on the results of the analysis in chapter IV regarding students' critical thinking skills in solving TIMSS questions in each category, the following conclusions can be drawn:

1. The critical thinking ability of students in the high category of subject HN. The subject is able to provide simple explanations because he is able to identify the problem well, explain the meaning of the problem that has been given, answer questions according to his thinking ability. In the indicator of building basic skills to find out the information in the problem, the subject also considers that in solving the problem, it is better to write down the steps for solving it as shown in the picture in indicator 1 (one). This means that the subject is

able to observe and consider the results of observations. The indicator of making conclusions can be obtained information based on the test results on problem number 2 (two) and the results of interviews that have been conducted, namely by multiplying numbers sequentially. In the indicator of making further explanations, it is stated that subject HN experienced the process of identifying assumptions by translating into his own language in providing explanations regarding the problem given. In the indicator of arranging strategies and techniques, subject HN explains that to solve the problem, the subject organizes a solution plan by writing down what is known from the problem and what is asked and solving the problem based on what is asked on the test sheet.

2. The critical thinking ability of students in the moderate category of NL subjects. NL subjects are able to provide information on what is known and what is asked based on the questions they have worked on. The information provided during the interview is the same as what has been written on the test sheet. So in this case, NL subjects are said to be able to provide simple explanations. NL subjects have not been able to explain the intent and purpose of why the subject wrote the data. So in this question, NL subjects are still lacking in building basic skills. In the indicator of providing further explanations, the subject identifies a definition of a number pattern using his own language, although the definition presented by the subject is not complete, but the subject has tried to provide information about what was asked by the researcher. The subject is said to be unable to organize strategies and techniques well because the subject has not been able to explain the steps to solve the problem well.
3. The critical thinking ability of students in the low category of subject MH. The subject is able to provide information on what is known and what is asked based on the questions he has worked on. Subject MH is said to be able to provide simple explanations. Subject MH has not been able to explain the meaning of his writing, the subject also does not often work on questions as given. So in this case, subject MH is still lacking in building basic skills. Based on the results of the interview, subject MH provided information about how many materials are available to make toy cars, but the subject has not been able to answer the question correctly. Subject MH has not been able to provide information regarding why the subject multiplied the numbers. So in this case, subject MH is categorized as still less able to draw conclusions. The subject identified a definition of a number pattern using his own language, although the definition presented by the subject was incomplete, but the subject had tried to provide information. The subject did not have another way to answer the question other than what the subject had written. So this expert means the subject has not been able to organize strategies and techniques.

Suggestions, based on the results of the discussion and conclusions obtained, the author suggests: 1) Mathematics teachers should introduce questions that resemble TIMSS questions or actual TIMSS questions to students so that they can train students in critical thinking. 2) Teachers should increase student practice in working on questions, both TIMSS-shaped and non-TIMSS-shaped questions, so that they can train their thinking skills.

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