Analysis of mathematical thinking skills in multiple intelligence perspectives of primary school students

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Abstract. This research is motivated by thinking skills and awareness of the importance of mathematics needs to be taught and trained to students from an early age because in daily life many things are related to thinking skills and awareness of the importance of mathematics in everyday life. The purpose of this study is to analyze mathematical thinking skills from the perspective of multiple intelligences of elementary school students. This research uses a qualitative approach and uses descriptive qualitative methods. The population in this study was Grade V Elementary School Students in Cimahi City, while the sample consisted of 20 students. The instrument used consisted of multiple intelligences tests in the form of a questionnaire logical-mathematical, intrapersonal, and interpersonal logic intelligence. The results showed that the intelligence of logical-mathematical and intrapersonal based on multiple intelligences of elementary school students in Cimahi in 2020 each was in the medium category. While interpersonal intelligence is in between medium and low categories.

1. Introduction
The legislation in the country of Indonesia concerning the National Education System emphasizes that mathematics is one of the mandatory lessons that must be taken by all students at every level. The demand for students' abilities in mathematics is logical and critical reasoning ability in problem-solving, not just having the ability to count alone. The purpose of the mathematics lessons mentioned is so that students can understand, use reasoning, solve problems, communicate, and have an attitude of respect for mathematics. Solving this problem is more to the problems faced daily, not just problems in the form of routine problems. Skills in thinking are needed to find and overcome a problem. When a person is faced with a problem that must be resolved, then at that moment thinking skills will emerge. Thinking skills needed in solving problems are thinking critically, systematically, logically and creatively. The ability is essential so that students can acquire, manage and utilize information that is always changing. One of the efforts to achieve these goals is through the learning of mathematics [1-9].

Mathematics is one of the essential foundations so that the subjects are taught from an early age to college. As a structured-concept science that has an order that learns about the regularity of pattern, organized, structure, and mathematical concept served from the simplest to the most complex [10,11].

Gardner has emphasized that each individual has eight intelligences, summarized in multiple intelligences [12]. That is linguistic intelligence, mathematical, spatial, musical, kinesthetic, interpersonal, intrapersonal, and naturalist. Thinking skills and awareness of the importance of mathematics need to be taught and trained to students from an early age because in everyday life many things are related to thinking skills and awareness of the importance of mathematics in daily life.
Analysis of multiple intelligences thinking skills is used as the first step as a guideline to minimize the problems that have been described above because it is by following the characteristics of elementary school students who are still happy to play and by following technological developments that have begun to spread to elementary school children. The intelligence that will be analyzed in this study is mathematical, interpersonal, and intrapersonal intelligence. Therefore, the title of this research is "Analysis of Mathematical Thinking Skills in the Perspectives of Multiple Intelligences of Elementary School Students".

Based on the description that has been disclosed in the background of the study, the formulation of the research problem is stated as follows: "What are the results of the analysis of mathematical thinking skills from the perspective of multiple intelligences of elementary school students?"

Mathematics is an important part that cannot be separated from human life. In the world of education, mathematics is often found in other subjects. Thus, mathematics is called applied science. One of the goals of learning mathematics is to educate the life of the nation. Things to consider in mathematics are interest and will, and hard work in thinking [13].

Mathematics is one of the subjects that are closely related to real life. There are no small things and problems around us that require mathematics. Depdiknas [13] said that, Mathematics has an important role in developing human thought power so that mathematics becomes the foundation for the development of modern technology. Mathematics equips students to have logical, analytical, systematic, critical, and cooperative skills. Therefore, mathematics lessons must be given to all students for every level of education, from elementary to university level. The scope of mathematics subjects are numbers, data processing, mathematical story problems, geometry, and measurement. Based on the scope of these mathematics subjects, the scope of mathematics is an important part that cannot be separated from human life.

Intelligence can be seen as the ability to understand the world, think rationally, and use resources effectively when faced with a challenge [14]. According to Jasmine [15], multiple intelligences is the highest validation of an idea that individual differences are important. Its use in education is very dependent on the recognition, recognition, and appreciation of each or every way students learn, students' interests and talents. Fathani [16] asserted that multiple intelligences are present in each individual, but only one or more individuals have the highest level of multiple intelligences. However, in the practice of learning in schools, it is proper for a teacher to have data about the level of the tendency of multiple intelligences per student.

Multiple Intelligences is the development of intellectual intelligence, emotional intelligence, and spiritual intelligence. Indeed multiple intelligences are present in each individual, but each individual will have one or more multiple intelligences that have the highest level of multiple intelligences [17].

Today's society is demanded to be able to develop its knowledge optimally to be more intelligent and critical in receiving and processing information. Because it is very important to support increasingly complex problem-solving. To answer the needs and demands of the times, education plays an important role in preparing the next generation of competent nations, one of which is mastery and understanding of mathematics holistically. Mathematics is used as a foundation for various other scientific developments, especially science and technology. Each individual has a unique intelligence called multiple intelligences, it is not perfect if it does not have sufficient mathematical abilities. We must be able to utilize mathematics not only theoretically, but also applicatively. All who join mathematics education must continue to make a concerted effort to improve their mathematical abilities.

2. Method
This research is a descriptive study that aims to analyze mathematical thinking skills in the perspective of multiple intelligences elementary school students. Withney [18] states that descriptive research is appropriate for making a picture of a situation or event. Other than that, Sukmadinata [19] said descriptive research is the most basic form of research that aims to describe the phenomena that exist.

The steps of the research activities will be carried out as follows: 1) Formulate the problem, develop an assessment of thinking skills and student awareness of the importance of mathematics in everyday life; 2) Provide a general description of the research activities to be carried out; 3) Reflect and discuss various stages; 4) Collaborating with elementary schools to be used as research subjects; 5) Develop a
questionnaire instrument by validating in the field and validating experts; 6) Implementation of distributing questionnaire instruments; 7) Evaluate the activities of distributing questionnaire instruments with online tests; 8) Drawing conclusions from the results of analysis and data processing obtained in this study.

The population in this study were all fifth-grade elementary school students in the Cimahi city environment. The reason for choosing schools in Cimahi City is that most of the students in Cimahi Elementary School come from various regions in Indonesia so it is assumed that it is appropriate to analyze students' thinking skills and awareness of the importance of mathematics in the perspective of multiple intelligences with daily life. The sample in this study was grade V students of SDN Setianamanah Mandiri 1 Cimahi and SDN Cibabat Mandiri 1, the number of students was 20 students and assumed to have the same relative homogeneous level in terms of location, school culture and grade V grade average in mathematics learning. The difference in the number of students in each school is not a problem. This is in line with what was stated by Prabowo [20] if the sample obtained has an unequal number, then it does not matter because in this case to determine whether or not the homogeneous sample is seen from nature or condition, not from the number of students quantitatively.

3. Result and Discussion

The 3 types of intelligence and each the indicators consists of 7 statements presented in Table 1. The questionnaire consists of five rating scales: rarely, sometimes, often enough, often, and always. The range of scales used is 1 - 5, so the lowest score of a student is 7 (7 × 1 = 7) and the highest score is 35 (7 × 5 = 35). Therefore, the median is (7 + 35) / 2 = 21.

| Type of Intelligence                      | Indicator                                      | Number Statement |
|------------------------------------------|------------------------------------------------|------------------|
| Logical-mathematical                     | Calculate, measure, and consider propositions and hypotheses and complete mathematical operations. | 1, 4, 7, 10, 13, 16, 19 |
| Intrapersonal                            | Understand yourself from the desires, goals, and emotional systems that emerge clearly in his work. | 2, 5, 8, 11, 14, 17, 20 |
| Interpersonal                            | Understanding and communicating with others is seen from differences, temperament, motivation, and ability. | 3, 6, 9, 12, 15, 18, 21 |

The logical-mathematical, intrapersonal, and interpersonal intelligence questionnaire scores were categorized on a scale of 5 using the Normative Reference Assessment approach presented as follows Table 2.

| Score Interval | Score | Information |
|----------------|-------|-------------|
| 29 and above   | A     | Very High   |
| 22 - 28        | B     | High        |
| 15 - 21        | C     | Medium      |
| 8 - 14         | D     | Low         |
| 7 and below    | E     | Very Low    |

Based on Table 2, the recapitulation of the intelligence score of mathematical logic of 20 people according to the numbers and values obtained from the Multiple Intelligences Test (Table 3).
Table 3. Logical- mathematical intelligence results

| Score Interval | Score | Information | Frequency | Percentage (%) |
|----------------|-------|-------------|-----------|----------------|
| 29 and above   | A     | Very High   | 2         | 10             |
| 22 - 28        | B     | High        | 5         | 25             |
| 15 - 21        | C     | Medium      | 10        | 50             |
| 8 - 14         | D     | Low         | 2         | 10             |
| 7 and below    | E     | Very Low    | 1         | 5              |

From the calculation of the average value of the questionnaire score of 18.50 compared with the category of logic-mathematical intelligence, the average value is in medium category. So, it can be concluded that the intelligence of elementary school students' mathematical logic is in medium category.

The results of the recapitulation of Intrapersonal intelligence scores of 20 people in accordance with the numbers and values obtained from the Multiple Intelligences Test (Table 4).

Table 4. Intrapersonal intelligence results

| Score Interval | Score | Information | Frequency | Percentage (%) |
|----------------|-------|-------------|-----------|----------------|
| 29 and above   | A     | Very High   | 2         | 10             |
| 22 - 28        | B     | High        | 4         | 20             |
| 15 - 21        | C     | Medium      | 10        | 50             |
| 8 - 14         | D     | Low         | 2         | 10             |
| 7 and below    | E     | Very Low    | 2         | 10             |

From the calculation of the average value of the questionnaire score of 18.80 compared to the intrapersonal intelligence category, the average value is in medium category. So, it can be concluded that the intrapersonal intelligence of Elementary School Students is in medium category. Furthermore, the results of the recapitulation of Interpersonal intelligence scores of 20 people are by following the numbers and values obtained from the Multiple Intelligences Test (Table 5).

Table 5. Interpersonal intelligence results

| Score Interval | Score | Information | Frequency | Percentage (%) |
|----------------|-------|-------------|-----------|----------------|
| 29 and above   | A     | Very High   | 2         | 10             |
| 22 - 28        | B     | High        | 3         | 15             |
| 15 - 21        | C     | Medium      | 6         | 30             |
| 8 - 14         | D     | Low         | 6         | 30             |
| 7 and below    | E     | Very Low    | 3         | 15             |

Based on the calculation of the average value of the questionnaire score of 17.5 are in the moderate category and 17.33 are in a low category compared to the intrapersonal intelligence category, then the average value of the majority is in the moderate and low category. So, it can be concluded that the intrapersonal intelligence of Elementary School Students is in medium and low categories.

It can be seen that the test scores of each intelligence vary. Observing this, mathematical thinking skills have greater variation influenced by different combinations of intelligence in each individual. There is no individual in the same combination of intelligence. Gardner [21] says that we are all so different mainly because we all have different combinations of intelligence. In addition, the results of research conducted by Kartikasari and Widjajanti [21] showed that at the 5% significance level, learning by problem-based learning approach based on Gardner's multiple intelligences effective in terms of student’s achievement, the mathematical connection capability, and self-esteem of students. However,
although there are some problems have been effective on achievement tests and mathematical connection test result which have low achievement.

4. Conclusion
Based on the results of the study it can be concluded that: (1) Mathematical logic intelligence based on multiple intelligences of elementary school students in Cimahi in 2020 is in the sufficient category. It is also known that students' mathematical thinking skills vary greatly, due to a combination of different bits of intelligence between one student and another student; (2) Intrapersonal intelligence based on multiple intelligences of elementary school students in Cimahi in 2020 is in the sufficient category; (3) Interpersonal intelligence based on multiple intelligences of elementary school students in Cimahi 2020 is in the moderate and low categories.

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