Analysis of Mathematical Reasoning Ability Viewed from Student Learning Motivation

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Abstract

This study aims to describe mathematical reasoning abilities in terms of student motivation in class VIII SMP Negeri Satap 1 Lambandia. This type of research is qualitative. The subjects of this study consisted of 20 students of class VIII SMP Negeri Satap 1 Lambandia. The instrument used is a mathematical reasoning ability test consisting of 4 questions, a learning motivation questionnaire consisting of 16 statements, and interview guidelines. The results showed that; 1) The average mathematical reasoning ability of students is 40.78 which is in the fairly low category. Many students who have a high level of ability score is 1 (5%), students with a moderately low ability score of 10 (50%), and many students who have a low ability score are 9 (45%); 2) The number of students with high levels of learning motivation is 7 students (35%), moderate learning motivation is 5 students (25%), and low learning motivation is 8 (40%); 3) Students with high learning motivation have the highest average ability with an average score of 48.66 with quite low criteria, followed by students with moderate and low learning motivation with scores of 40 and 35.15, both of which are in the criteria low. Subjects with high learning motivation are generally able to understand 3 indicators of mathematical reasoning, namely using patterns and relationships to analyze mathematically, estimate the completion process and develop valid arguments using systematic steps. Subjects with moderate and low learning motivation were only able to understand 3 indicators, namely using patterns and relationships to analyze mathematically, estimate the completion process and develop valid arguments using systematic steps. So it can be said that high, medium and low learning motivation has the same level of reasoning ability, namely in the low category.

Keywords: Ability, Mathematical Reasoning, Learning Motivation

A. Introduction

Through good mathematics education activities, it is possible for students to get some important provisions to face the challenges of the era of rapid globalization. The ability to reason, think critically, carefully, logically, systematically, creatively, and innovatively are some of the abilities that can be developed through good mathematics education activities. The general purpose of learning mathematics according to Kusumawardani (2018: 589) stipulates that there are five standards of mathematical ability that must be inherent in students, namely problem solving, reasoning and proof, connection, and communication.

Mathematical reasoning ability is very important to support learning success. This is stated in the Minister of Education and Culture of the Republic of Indonesia number 37 of 2018 concerning core competencies and basic competencies of primary and secondary education units. Especially in mathematics, the dimensions of thinking or mathematical reasoning are contained in a series of learning competencies arranged into one skill that must be mastered by students.

Studying mathematics will make students think systematically and structured because students will always be faced with problem solving, causal relationships, logical, scientific, and reasonable questions and answers, Kariadinata (Solihat, 2018: 6).

According to Lestari & Yudhanegara (Wulandari, 2020: 3) states that mathematical reasoning is an ability that students have to analyze, generalize, synthesize, or integrate and give an appropriate reason and solve a problem that is not routinely done, therefore in order to To solve problems and draw logical conclusions, students must be able to improve their mathematical reasoning abilities. Meanwhile, according to Salmina (2018:611) mathematical reasoning ability is the ability to connect problems into an idea or ideas so that they can solve mathematical problems. So that mathematics lessons and mathematical reasoning are two related things, namely solving mathematical problems requires reasoning and reasoning abilities can be honed from learning mathematics.

Based on the results of tests and surveys by the 2018 Program for International Student Assessment (PISA) revealed by the OECD (in the 2014 Ministry of Education and Culture), it can be seen that the ability of Indonesian students for mathematics has an average score of 379 where the OECD average score that has been set is 480. This is one proof that the mathematical reasoning ability of students in Indonesia is in the low category and must be improved optimally. This is supported by the results of research conducted by Aprilianti et al (2019:524) which shows that students' mathematical reasoning abilities are still low.

The low ability of mathematical reasoning can be caused by several factors, namely the level of intelligence / intelligence, attitudes, interest in learning, learning motivation, and so on. One of the causes is the low motivation of students to learn mathematics. The learning process will certainly not be carried out properly without motivation to learn, this is due to the lack of an internal and external encouragement or self-motivation to carry out a learning activity. Based on the results of observations at SMP Negeri Satap 1 Lambandia with mathematics teachers, the learning motivation possessed by students tends to decrease due to the impact of the Covid-19 pandemic which greatly affects the learning process of students, considering that the learning process is carried out face-to-face but via online, resulting in lack of interaction between teachers and students.

Learning motivation according to Agsya, et al (2019:33) is a factor that results in the emergence of a self-desire to carry out learning activities or activities voluntarily or without coercion to obtain maximum results. Meanwhile, according to Emda (2018:175) states that learning motivation is a series of business activities to prepare certain conditions that will occur, which results in students willing to do something and if they are not willing, they will try to eliminate or deny their dislike.

If the learning motivation possessed by students increases, it will have an impact on increasing mathematical reasoning abilities which will develop well, of course there will be no problems or obstacles, but this is contrary to the reality on the ground.
Learning motivation really contributes well to students' mathematical reasoning abilities. This means that there will be a positive relationship or mutually influencing relationship between learning motivation and students' mathematical reasoning abilities.

B. Methodology

This type of research is a descriptive research with a qualitative approach. This research was conducted at SMP Negeri Satap 1 Lambandia, having its address in East Kolaka District, Kolaka Regency.

The procedures for this research are as follows:

1. Conducted a visit to SMP Negeri Satap 1 Lambandia and asked the head of SMP Negeri Satap 1 Lambandia for research permission verbally as well as initial observations;
2. Prepare student learning motivation questionnaire sheet instruments, mathematical reasoning ability instruments, and interview guidelines to explore students' mathematical reasoning abilities in terms of student learning motivation;
3. Provision of student learning motivation questionnaires;
4. Analysis of student learning motivation questionnaire results;
5. Taking research subjects who will be given a mathematical reasoning ability test;
6. Implementation of students' mathematical reasoning ability tests;
7. Interview students' mathematical reasoning ability;
8. Analysis of the results of students' mathematical reasoning abilities;
9. Description of mathematical reasoning ability in terms of student learning motivation;

Data collection in the study was carried out in the following way: This mathematical reasoning ability test was in the form of a description test. The test results are used to measure students' mathematical reasoning abilities. Determination of students' mathematical reasoning ability test scores is based on scoring guidelines to determine students' ability levels. The non-test technique is using a questionnaire to obtain information about students' learning motivation.

Sugiyono (Umrati and Wijaya, 2020: 85-86) stated that qualitative data analysis is the process of systematically searching and compiling data obtained from interviews, field notes and documentation, by organizing data into categories describing it into units to synthesize arrange into patterns choosing which ones are important and will be studied and make conclusions so that they are easily understood by themselves and others.

Siyoto and Sodik (2015: 121-124) say that the purpose of qualitative data analysis is to find meaning behind the data through the recognition of the subject. Researchers are faced with various objects that produce data that must be analyzed. The data obtained from the object is related to the subject but the relationship is still unclear. Thus, analysis is needed to find out the relationship and become a general understanding.

Qualitative data analysis was carried out inductively, ie qualitative research did not start from theoretical deduction but started from empirical facts. Researchers go into the field, study, analyze, interpret and draw conclusions from phenomena that exist in the field. Researchers are faced with data obtained from the field. From these data, researchers must analyze so as to find meaning which then becomes the result of the research.

C. Findings and Discussion

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Learning motivation questionnaire data was obtained after giving a questionnaire to students consisting of 16 statements. Each student fills in the assessment column for each statement with each predetermined score. The description of the student motivation questionnaire data for class VIII SMPN Satap 1 Lambandia can be seen in table 1 below:

Table 1 Learning Motivation Data for Class VIII SMPN Satap 1 Lambandia

Category	Interval	Frequency	Percentage
Very high	$X \geq 82$	0	0
high	$74 \leq X < 82$	7	35%
medium	$66 \leq X < 74$	5	25%

| low | $58 \leq X < 66$ | 8 | 40% |
| Very low | $X < 58$ | 0 | 0 |

The table above shows that the number of students with a high level of learning motivation is 7 students (35%), while those with moderate learning motivation are 5 students (25%), and 8 students with low learning motivation (40%).

From the data collected through the students' mathematical reasoning ability tests, they showed varying scores. The description of the mathematical reasoning ability data of class VIII SMPN Satap 1 Lambandia can be seen in table 2 below:

Table 2 Data on Mathematical Reasoning Ability of Class VIII SMPN Satap 1 Lambandia

Interval	Ability Level Mathematical Reasoning	Frequency	Percentage
$80 < x \leq 100$	Very high	0	0
$60 < x \leq 80$	high	1	5%
$40 < X \leq 60$	medium	10	50%
$20 < X \leq 40$	low	9	45%
$0 < X \leq 20$	Very low	0	0

From the table above, it is found that many students who have a score with a medium ability level are 10 (50%), students with a Low ability score are 9 (45%), and many students who have a high ability score are 1 (5%). While the average of all is 33.13 or is in the low category.

The results of the analysis of students' abilities based on indicators of mathematical reasoning ability by looking at the average of each indicator are.

Table 3 Average Mathematical Reasoning Ability of SMPN Satap 1 Lambandia students

No.	Indicator	Average	Category
1.	Using patterns and relationships to mathematical analysis	56,5625	medium
2.	Estimating the completion process	40,63	medium
3.	Construct valid arguments with using systematic steps	38,75	low
4.	Draw logical conclusions	21,1875	low
	Average	40,7813	medium

The results of the analysis of each indicator of mathematical reasoning show that the indicator using patterns and relationships to analyze mathematically has a fairly high average of 56.56 (Medium) While the indicator estimates that the completion process is quite high, namely 40.63 (Medium), the indicator makes arguments namely 38.75 which is in the (Low) category, and the indicator drawing logical conclusions has the lowest average of 21.1875 (Low)

The results of the analysis of student learning motivation based on mathematical reasoning abilities are as follows:

Table 4 Classification of Student Learning Motivation and Mathematical Reasoning Ability

No	Learning Motivation	Average Mathematical Reasoning Ability	Category
1	high	48,66	medium
2	medium	40	low
3	low	35,16	low

Table 4 above shows that students with high learning motivation have the highest average ability with an average score of 48.66 with Medium criteria with an average of 40 and low with an average of 35.16. The classification of ability and learning motivation is based on indicators of problem solving ability as follows:

Table 5 Classification of Students' Learning Motivation and Mathematical Reasoning Ability Based on Indicators

No	Indicator	Learning Motivation		
		high	medium	low
1.	Using patterns and relationships to mathematical analysis	68,75	55,00	46,88

2.	Estimating the completion process	50,89	37,50	33,59
3.	Construct valid arguments with using systematic steps	45,54	41,25	31,25
4.	Draw logical conclusions	30,36	26,25	25,00

The table above shows that students with high learning motivation have an average score on each score that is more dominant than others, namely in indicator 1 with an average score of 68.75, indicator 2 with a score of 50.89 and indicators three and four are 45.54 and 30. ,36

The descriptive data on mathematical reasoning abilities in terms of learning motivation of class VIII SMPN Satap 1 Lambandia can be seen in table 6 below:

Table 6 Average Mathematical Reasoning Ability Judging from the Learning Motivation of Class VIII Students at SMPN Satap 1 Lambandia

Learning Motivation	Score of Ability Mathematical Reasoning	Ability Mathematical Reasoning Average	category
medium	37,5	40	low
	43,75		
	45,31		
	37,5		
	35,94		
low	35,94	35,15875	low
	40,63		
	34,38		
	34,38		
	37,5		
	25		
	29,69		
	43,75		
high	64,06	48,66	medium
	40,63		
	45,31		
	53,13		
	45,31		
	46,88		
	45,31		

Based on table 6 it can be stated that students with high learning motivation have mathematical reasoning abilities in the medium category with an average of 48.66. Students with low learning motivation have mathematical reasoning abilities in the low category with an average of 35.15 and students with moderate learning motivation have mathematical reasoning abilities in the low category with an average of 40. This is in line with the results of Wulandari's research (2020:152).) that the higher the students' learning motivation, the students have good mathematical reasoning abilities, on the contrary, the lower the students' learning motivation, the students will have low mathematical reasoning abilities.

E. Conclusion

From the results of research and discussion, this study can be concluded as follows: 1) Student motivation at SMPN Satap 1 Lambandia is in the low category of 40% (8 people out of 20 students); 2) The mathematical reasoning ability of class VIII SMPN Satap 1 Lambandia is in the low category with an average of 41.09 and a percentage of 50% (10 people out of 20 students); 3) Class VIII students of SMPN Satap 1 Lambandia who have high learning motivation have

reasoning abilities that are in the medium category, students who have moderate and low learning motivation have reasoning abilities that are in the low category.

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