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Analysis of Mathematical Problem Solving Ability Viewed from Student Learning Style

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Abstract

This study aims to describe mathematical problem solving abilities in terms of student learning styles. This type of research is descriptive qualitative. The subjects of this study consisted of 24 students of class IX SMP Negeri 16 Konawe Selatan. The research instruments used were: (1) mathematical problem solving ability test questions, (2) interviews, (3) learning style questionnaires. The results obtained information that: (1) From 24 students of class IX SMP Negeri 16 Konawe Selatan obtained information that there are 5 students who have high category mathematical problem solving ability with a percentage of 20.83%. There are 2 students who have the ability to solve mathematical problems in the medium category with a percentage of 8.33%. and as many as 17 students with low category mathematical problem solving abilities with a percentage of 70.83%. (2) The unimodal learning style is dominated by the auditory type as many as 8 students with a percentage of 33.33%, then the visual type as many as 2 students with a percentage of 8.33%, and read/write as many as 1 student with a percentage of 4.17%. Meanwhile, the multimodal learning styles identified in the study were bimodal learning styles consisting of 5 students with a percentage of 20.83%, A-R with a percentage of 2 students with a percentage of 8.33%, A-K with 1 student with a percentage of 4.17%, trimodal learning styles with only A-R-K types as many as 2 students with a percentage of 8.33%, and a quadmodal learning style there is V-A-R-K as many as 3 students, with a percentage (12.50%). (3) The mathematical problem solving ability of students with unimodal learning style Visual (V), Auditory (A) is in the low category and the type of Read/write (R) is in the medium category, mathematical problem solving abilities of students with bimodal learning style type A-R and A-K are in the low category while the V-K type is in the medium category, the mathematical problem solving ability of students with trimodal learning style type A-R-K is in the low category, and mathematical problem solving abilities of students with quadmodal learning style are V-A-R-K (visual-auditory-read/write- kinesthetic) is still in the low category.

Keywords: Ability, problem solving, learning style

A. Introduction

According to the Law of the Republic of Indonesia No. 20 of 2003 concerning national education that "Education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have religious spiritual strength, self-control, personality, intelligence, noble character, and the skills they need. , society, nation and state". The education provided to students includes several lessons, one of which is mathematics.

Education is very important for every individual, both for personal interests and for his position as a citizen. According to Hamalik (2015: 3) education is a process in order to influence students to be able to adapt as best they can to their environment, and thus will cause changes in themselves that allow them to function in people's lives. Education can also be interpreted as a human endeavor to foster his personality in society.

One of the educational paths that can be taken is formal education. Formal education is education that is held at every level from elementary school (SD) to tertiary education. One of the subjects that support various aspects of life is mathematics, therefore mathematics must be studied starting from the elementary school level to the tertiary level (Prakasa, 2018:1).

In learning mathematics, there will be a change in the cognitive, affective, and psychomotor domains of the individual himself. One aspect that must be mastered by students is the ability to solve mathematical problems in which almost every standard of competence and basic competence is found to emphasize the need for problem solving abilities. According to Asikin (2012:23), learning mathematics at school has several objectives, namely: (1) organizing students' logical reasoning and building their personality, and (2) making students able to solve mathematical problems and apply mathematics.

Meanwhile, the National Council of Teachers of Mathematics, according to Effendi (2012:2), sets five standards of mathematical ability that must be possessed by students, namely problem solving skills, communication skills, connection skills, reasoning abilities, and representation abilities. According to Dewanti (2011: 36), NCSM (National Council of Science Museum) places problem solving as the first order of the 12 essential components of mathematics. As quoted by Ellison (2009:16), states that problem solving ability is an important aspect of independent learning and helps move away from teaching that is educational.

According to Fitriana (Zulkipli & Ansori, 2018: 35) problem-solving ability is the highest knowledge that requires a unique skill to get a solution to the problems experienced by combining several concepts and rules that have been previously obtained. In addition, according to Ilmiyana (2018: 3) problem solving abilities should be possessed by every student, because problem solving abilities provide great benefits for students in seeing the relevance between mathematics lessons and other sciences, as well as in real life. Students are said to be able to solve mathematical problems if they understand, can determine the right strategy, then apply it in problem solving. Good problem solving is also very influential on learning outcomes, especially in mathematics, because problem solving abilities can help problems both in the teaching and learning process in achieving a goal and in everyday life. Therefore, the problem solving ability of students really needs to be considered by the teacher. The more students learn independently, the more effective they become as students.

However, in reality, the mathematical problem solving ability of junior high school students is still very low. This can be seen from the results of the PISA and TIMSS surveys. The results of the PISA survey for mathematical ability every year, Indonesia always scores below the international average and ranks below. In the survey, one aspect of cognitive solving ability that was assessed was mathematical problem solving ability. The results of the 2015 PISA study, Indonesia is ranked 63rd out of 70 participating countries with an average score of 386 while the international average score is 490 (OECD, 2016). The TIMMS survey results are not much different from the PISA results. In 2015 Indonesia was ranked 45th out of 50 countries with a score of 397. This means that Indonesia's position in each of its participations always gets a score below the set average. Students participating in PISA and TIMSS representatives from Indonesia are the best selected students in Indonesia. Based on the survey results, it can be seen

that even the best students have low results, especially other ordinary students (Umrana, Cahyono, & Sudia, 2019:68).

Based on the results of interviews by researchers with mathematics teachers at SMP Negeri 16 Konawe Selatan, information was obtained that when the teacher gave questions related to problem solving, students were still confused and did not immediately solve the questions given, but what they did was carelessly doing and waiting for answers from students. other. Students still have difficulty in solving the problem correctly. In addition, there are also differences in student learning styles, according to the teacher, these differences in learning styles are often seen during the learning process. Some students are not able to communicate in learning when the surrounding conditions are tense, but there are also some students who are easier to understand the lesson if they see the material being taught firsthand. Differences in student learning styles can also be seen from how students study every day and the habits of students in learning, whether in the classroom, in the library or in other places.

Each student certainly has different characteristics in the process of forming knowledge in learning something as well as in understanding mathematical problems. According to Fleming (2006) who divides learning modalities into 4 components, namely visual, auditory, read/write and kinesthetic. In the learning process, there are students who are easier to remember, then form it into knowledge of what is seen (visual), there are also students who easily remember information and then shape it into knowledge of what is heard (auditory), then there is also something that is read/read. written (read/write), and there are also those who like to learn to practice (kinesthetic). This way of learning will become a study habit and then form a style called learning style.

Problem-based learning provides opportunities for students to explore collecting and analyzing complete data to solve problems faced in real life and problems in mathematics. Umrana, Cahyono, & Sudia, (2019:69) explained that the level of intelligence and problem solving of students was different. It is very important for a teacher to recognize the learning style of each student.

Therefore, teachers need to know how the actual path or process of mathematics can be understood or mastered by students. Knowing students' learning styles will greatly assist teachers in the learning process. Teachers can help students maximize mathematical problem solving and encourage students to construct knowledge in their minds based on their own learning styles to influence logical thinking, analysis and student creativity. Meanwhile, according to Bachtiar (Ariansyah, 2017:5), the level of intelligence and problem solving is caused by the differences in the learning styles of each student.

Understanding each student's learning style is important. Nasution (2010:55) compatibility between teaching styles and student learning styles can enhance learning effectiveness. On the other hand, a mathematics teacher who is not careful in using learning methods in the classroom will make it difficult for students to accept the material he provides. A teacher must also know the learning styles of their students in order to be able to arrange appropriate learning according to students' learning styles (Jahring and Chairuddin, 2016: 28).

B. Methodology

This type of research is a descriptive research with a qualitative approach. This study provides an overview or descriptive of the mathematical problem solving ability of class IX students of SMP Negeri 16 Konawe Selatan by classifying students' abilities in class according to their learning style.

In this study, qualitative descriptive data analysis techniques were used using the Miles and Huberman model. In qualitative data analysis, it is carried out interactively and takes place continuously until it is complete, so that the data is saturated (Sugiyono, 2019:440).

Data processing is carried out in the form of: 1) Data analysis, namely analyzing the data that has been obtained, researchers in this case can interpret the data obtained in the field; 2) Drawing conclusions and verification, based on previous activities, the next step is to conclude and verify or critique sources whether the data is valid or not; 3) Narrative of analysis results, namely reporting of research results in written form and usually a qualitative approach tends to use descriptive analysis methods.

C. Findings and Discussion

From the data collected through the mathematical problem solving ability test, it shows that the students' scores vary. The data description of the mathematical problem solving ability of class IX students of SMP Negeri 16 Konawe Selatan can be seen in Table 1 as follows:

Table 1 Data on Mathematical Problem Solving Ability of Class IX Students of SMP Negeri 16 Konawe Selatan

Mathematical Problem Solving Ability	High	Medium	Low Amount	Amount
	65 - 100	55 - 64	0 - 54	
Frequency	5	2	17	24
Percentage	20,83%	8,33%	70,83%	100%

From table 1 above, from 24 students in class IX of SMP Negeri 16 Konawe Selatan, information is obtained that there are 5 students who have high category mathematical problem solving abilities, 2 students who have moderate mathematical problem solving abilities, and 17 students with problem solving abilities. low category mathematics. Furthermore, the test results are categorized per indicator to determine the mathematical problem solving ability per indicator. The percentage data per indicator can be seen in table 2 below:

Table 2 Average Mathematical Problem Solving Ability of Class IX Students of SMP Negeri 16 Konawe Selatan

No	Indicator of mathematical problem solving ability	Average of each indicator	Category
1	Understanding the problem	38,056	Low
2	Planning trouble	24,583	Low
3	Carry out calculations	59,722	Medium
4	Check again	33,333	Low
Average		38,923	Low

Based on Table 2 above, the average mathematical problem solving ability of class IX students of SMP Negeri 16 Konawe Selatan is 38,923 which is in the low category. The average for the first indicator, namely understanding the problem, is 38,056, which is in the low category, the average for the second indicator, namely determining a problem-solving plan, is 24,583, which is in the low category, the average for the third indicator, namely carrying out calculations, is 59,722, which is in low and medium level. the average for the fourth indicator, namely checking again is 33,333 which is in the low category.

The average mathematical problem solving ability of each learning style group is presented in the following table.

The classification of the learning styles of class IX students of SMP Negeri 16 Konawe Selatan was obtained based on the results of the VARK Questionnaire Edition 8.01 A total of 24 students had filled out the questionnaire, the results were as follows.

Table 3 Learning Styles of Class IX Students at SMP Negeri 16 Konawe Selatan

Type of learning style	Amount	Percentage
Unimodal		
V	2	8,33%
A	8	33,33%
R	1	4,17%
Multimodal		
V-K	5	20,83%
A-R	2	8,33%
A-K	1	4,17%
A-R-K	2	8,33%
V-A-R-K	3	12,50%

Amount	**24**	**100%**

Based on table 3, the results of the learning styles of class IX students of SMP Negeri 16 Konawe Selatan were found to be unimodal and multimodal. Unimodal learning style is a student learning style where students only have one type of learning style, while multimodal is a student learning style that has more than one type of learning style. Multimodal learning style consists of three parts, namely bimodal is a combination of 2 types of learning styles, trimodal is a combination of 3 types of learning styles, and quadmodal is a combination of 4 types of learning styles.

Unimodal learning style has 4 types of learning styles, namely visual (V), auditory (A), read/write (R), and kinesthetic (K). However, from the results of filling out the questionnaire to students, only 3 types of learning styles emerged, namely visual, auditory, and read/write. Unimodal learning style is dominated by auditory type as many as 8 students (33.33%), then visual type as many as 2 students (8.33%), and read/write as much as 1 student (4.17%). Meanwhile, for the multimodal learning style identified in the study, the bimodal learning style consisted of 5 students (20.83%), A-R 2 students (8.33%), A-K 1 student (4.17%), trimodal learning style only had A-R-K types as many as 2 students (8.33%), and quadmodal learning style consisting of V-A-R-K as many as 3 students (12.50%).

Tabel 4 Rata-Rata Kemampuan Pemecahan Masalah Berdasarkan Gaya Belajar Siswa Kelas IX SMP Negeri 16 Konawe Selatan

Type of learning style	Mathematical Problem Solving Ability	Category
Unimodal		
V	14	Rendah
A	28,25	Rendah
R	60	Sedang
Multimodal		
V – K	62,6	Sedang
A – R	52	Rendah
A – K	50	Rendah
A – R – K	42	Rendah
V – A – R – K	40	Rendah

Based on table 4 the average mathematical problem solving ability in general for each group is still relatively low, only in groups R and V-K who have an average mathematical problem solving ability in the medium category.

E. Conclusion

The mathematical problem solving ability of class IX students of SMP Negeri 16 Konawe Selatan with Visual (V) and Auditory (A) unimodal learning styles is 14 and 28.25 is in the low category. The mathematical problem solving ability of class IX students of SMP Negeri 16 Konawe Selatan with a unimodal learning style of Read/write (R) type is 60 in the medium category. The mathematical problem solving ability of class IX students of SMP Negeri 16 Konawe Selatan with a visual-kinesthetic (V-K) bimodal learning style is 62.6 in the medium category. Meanwhile, the average mathematical problem solving ability of class IX students of SMP Negeri 16 Konawe Selatan with a bimodal learning style of Auditory-Read/write (A-R) and Auditory-Kinesthetic (A-K) is 52 and 50 in the low category. The mathematical problem solving ability of class IX students of SMP Negeri 16 Konawe Selatan with a trimodal learning style of Auditory-Read/write-Kinesthetic (A-R-K) is 42 in the low category. While the mathematical problem solving ability of students with a trimodal learning style of Visual-Auditory-Read/write-Kinesthetic (V-A-R-K) is 40 in the low category.

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