Profile of Class VII Students' Abilities at SMPN 8 Pamekasan in Solving Mathematical Problems in The Form of Story Problems on Flat-Formed Material

Hairus Saleh[1], Yuliana Trisanti[2*]
[1,2] Universitas Madura, Jalan Raya Panglegur KM 3,5 Pamekasan, Indonesia, 69371
*Corresponding author: hairuss_math@unira.ac.id

Abstrak: This research aims to describe the profile of students with high, medium and low mathematical abilities in solving word problems on flat shapes. This study used descriptive qualitative method. Supporting instruments include mathematical ability tests, problem solving tests and interview guides. The data obtained from this research are the results of students' mathematical ability tests and the results of mathematical problem solving tests in the form of story questions, both written tests and interviews. The results of this research are that students with high mathematical abilities in understanding problems, planning solutions, carrying out solutions and re-examining problem solving are included in the good category. Students with moderate abilities in understanding problems are quite good, in planning solutions they are quite good, in carrying out problem solving plans they are in the poor category and in re-examining solutions they are not good enough. Students with low mathematical abilities in understanding problems are in the fairly good category, in planning solutions are quite good, while in carrying out and re-examining problem solving they are in the not so good category.

Kata kunci: *Problem Solving; Story Problems; Math Skills.*

PENDAHULUAN

Mathematics is one of the mandatory subjects taught from elementary school to tertiary level. Apart from that, mathematics is a science with a field of study that includes abstract concepts, symbols and patterns. James (Sariningsih & Purwasih, 2017) stated that mathematics is the science of logic regarding shape, arrangement, quantity, and a large number of related concepts and is divided into 3 fields, namely: algebra, analysis, and geometry. Thus, every mathematics lesson at school must consider mathematical abilities in solving a problem. The objectives of mathematics subjects according to the Ministry of Education and Culture 2013 are 1) Improving intellectual abilities, especially students' high level abilities, 2) Forming students' abilities in solving problems systematically, 3) Obtaining high learning outcomes, 4) Training students in communicating ideas , especially in writing scientific papers, and 5) Developing student character.

Problems are things that humans face very often and most people want to avoid them. However, when humans avoid a problem, there will definitely be new problems that they have to face and require a solution. If the problem cannot be resolved then there must be another way to solve the problem until the problem is finally solved. In learning mathematics, a problem can be said to be a problem, but with the condition that students understand the problem.

A problem solving ability is very important and needed in all aspects of life, including in the world of education. According to Anisa (2014), problem solving abilities are closely related to students' ability to read and understand the language of story problems, present them in mathematical models, plan

calculations from mathematical models, and complete calculations from non-routine problems. According to Polya (in Sahrudin, 2016) interprets problem solving as an effort to find a way out of a difficulty in order to achieve a goal. The role of teachers as educators has a big influence on the creation of students' abilities. The teacher's job is not just to convey lesson material. However, a teacher must be able to instill correct concepts from the learning material so that the knowledge they learn can be useful for themselves and others both now and in the future. Problem-solving ability can also be interpreted as a process in which someone tries to find a way out of a problem they face. Problem solving is the application of Slavin's knowledge and skills (in Listanti & Mampouw, 2020: 366). One strategy that is widely used in solving problems is the Polya model, according to Polya (in Asmana, 2018:3) in solving problems there are four steps that must be taken, namely as follows: 1) Understanding the problem (understand the problem), 2) Planning a solution (devising a plan), 3) Carrying out a plan and, 4) Checking back the solution obtained (looking back at the complete solution).

Each student has different mathematical abilities. This is supported by research conducted by Zuhri (in Isroil et al., 2017) which shows that each student has different mathematical abilities in terms of mathematics and also has different ways of thinking. Furthermore, Nurman (in Isroil et al, 2008) found that mathematical abilities influence problem solving abilities. Students who have high mathematical abilities have good problem solving abilities. Students who have moderate mathematical abilities have quite good problem solving abilities. Students who have low mathematical abilities have poor problem solving abilities.

This is in line with one of the goals and standards of the mathematics learning process, namely problem solving. (NCTM, 2000) sets five standards for the mathematics learning process, namely: (1) The ability to use mathematical concepts and skills to solve problems (problem solving); (2) Conveying ideas or ideas (communication); (3) Providing inductive and deductive reasons for making, defending, and evaluating arguments (reasoning); (4) Using approaches, skills, tools and concepts to describe and analyze data (representation); (5) Make connections between mathematical ideas, create models and evaluate mathematical structures (connections). Therefore, the ability to solve problems is very important for a student to have because problem solving is said to be the heart of mathematics. Problem solving is defined as a thinking process that is directly directed towards finding a solution or way out of a problem Solso, Maclin, & Maclin (in Listanti & Mampouw, 2020).

A problem that is often found in the world of education is the lack of ability of students to complete/solve mathematical problems. Not many people take this problem seriously because most teachers only focus on achieving test scores for both school

and national exams and this results in students only practicing doing math problems in their learning, not solving math problems.

The cause of students' low level of mathematical understanding lies in mathematics learning, most teachers only teach mathematics procedurally, for example teacher-centred learning, conveying mathematical concepts in an informative manner, and most teachers require students to solve many problems without in-depth understanding. As a result, students' reasoning abilities do not develop normally.

In solving problems related to mathematics, students do not only need the ability to solve problems, but also what is called a good thinking process. The thinking process is a process that occurs when students are faced with something new, both knowledge and problems that require a solution. The thinking process usually continues until the student finally finds the correct answer/solution. The student's thinking process will run well if there is direct involvement of a teacher who can guide him so that later he can help the student get results that are truly in accordance with his wishes. One example of a teacher's role in a student's thinking process is by asking again whether the answers the students produce are in accordance with the teacher's thoughts. With this, teachers can find out what the student's level of understanding is and also know where their weaknesses are, both in how to solve problems and how to understand a mathematical problem.

In learning, students are expected to gain experience, knowledge and skills that they already have to apply in solving problems. To gain the ability to solve problems, students must have a lot of experience in dealing with various mathematical problems. Many research results show that students who are given a lot of practice in solving identical problems have higher scores in problem solving tests than students who have less practice. In mathematics learning, this must be used to enrich, deepen and expand students' abilities in solving mathematical problems, to collect information in memory so that the best things can be obtained that can be used in problem solving, so students need previous experience. Cognitive development and students' interest in mathematics itself.

One of the materials in junior high school that is a problem for students is questions in the form of stories. According to (Ani & Rahayu, 2017) story questions are questions that are presented in the form of meaningful stories related to daily life based on previous learning experiences. Laily (2014) added that story questions are in the form of everyday verbal sentences that can be expressed in mathematical symbols. Based on the description above, it can be concluded that story questions are questions presented in the form of meaningful stories related to daily life based on previous learning experiences. In line with this, Newman (in Oktaviana, 2017) said that in solving mathematics story problems, students must go through five steps, namely: (1) reading the problem (reading), (2) understanding the problem (comprehension), (3) transformation,

(4) process skills, and (5) writing the final answer (encoding). Based on the researcher's experience in initial observations, it was easier for students to work on ordinary questions than questions in the form of stories because students often misinterpreted the contents of the story questions. This is related to Permendikbudristek Number 17 of 2021 concerning National Assessment (AN) and Minimum Capability Assessment (AKM) where almost the questions used are story questions, thus all students must be able to understand the concept of story questions so that they do not difficulty in taking part in the ANBK or AKM held by the school. One of the main goals of AKM is to improve students' abilities in literacy & numeracy.

The problems used by researchers in this research are problems related to story problems in plane material. This is because story questions are often found in everyday life and in the AKM exam questions, almost all types of questions related to numbers are in the form of story questions. This is to describe how students solve math problems in the form of story problems. In this study, researchers will use 3 class VII students at SMPN 8 Pamekasan who are categorized as having high mathematics ability, medium mathematics ability and low mathematics ability. According to Ratumanan and Laurens (in Maulidia, 2018:29). The measurement of students' mathematical abilities is as follows: 1) Students with high mathematical abilities if 80 ≤ TKM score obtained ≤ 100. 2) Students with moderate mathematical abilities if 60 ≤ TKM score obtained < 80. 3) Students with low mathematical abilities if 0 ≤ score TKM obtained < 60.

METODE

This research is descriptive research with a qualitative approach. Descriptive research is research that is intended to investigate circumstances, conditions, or other things (events, activities, etc.) whose results are presented in the form of a research report (Arikunto; 2013). This research was located at SMPN 8 Pamekasan, precisely in class VII E. This school is located on Jl. Jalmak No.43 A, Pamekasan District, Pamekasan Regency. The time used for conducting research starts from March 28 - June 10 2022, precisely in the even semester of the 2021/2022 academic year where students at that time are studying chapters related to flat shapes. The aim of this research is to describe the ability profile of class VII students at SMPN 8 Pamekasan in solving mathematical problems in the form of story problems on flat shapes. The students taken in this research were students with high, medium and low mathematics abilities. The subjects in this research were 28 students in class VII E of SMPN 8 Pamekasan. Meanwhile, the subjects whose data will be analyzed are 3 students. Where the 3 students will be classified into categories including 1 student with high mathematics ability, 1 student with moderate mathematics ability and 1 student with low mathematics ability. The selection of this subject was carried out by giving a mathematics ability test to 28 students in class VII E. Then 3

students were selected based on the results of the mathematics ability test with considerations given by the mathematics subject teacher, namely by selecting students who could be interviewed. The 3 subjects are RAR who has high mathematics ability (ST), MPADPS who has moderate mathematics ability (SS) and SAR who has low mathematics ability (SR). The research procedures carried out in this study consisted of 4 stages, namely: planning stage, implementation stage, data analysis stage and report creation stage. The instruments for this research are a mathematical ability test, a mathematical problem solving ability test and an interview. The math ability test is adapted from the National Examination questions which contain class VII mathematics subject matter before flat shape material, while the math problem solving ability test is in the form of story questions containing flat shape material. After the subject takes the problem solving test, the next step is to interview the subject based on the interview guide that has been created which aims to find out how the student is able to solve problems. The interview guide was created in a structured manner to investigate students' problem solving abilities. The data analysis techniques in this research are data collection, data reduction, data presentation, drawing conclusions. The indicators used in problem solving in this research are the indicators put forward by Polya, the following are the problem solving indicators based on Polya:

Table 1. Indicators of Problem Solving Ability According to Polya

Problem Solving Stage	Indicator
Understanding the Problem	Students can mention the information provided and the questions asked
Planning the Solution	Students have a problem solving plan that they use and the reasons for using it
Carry out a Solution Plan	Students can solve problems according to the problem solving steps they use with correct results
Double Check the Solution	Students review the problem solving steps they use

HASIL DAN PEMBAHASAN

Based on the research results, a profile of students' mathematical problem solving abilities in the form of story problems on flat shapes material can be obtained as follows:

At the stage of understanding the problem, the subject is quite careful in reading and understanding the TPM 1 and TPM 2 questions so that he is able to remember and identify the elements known in the problem by understanding what is known in TPM 1 and TPM 2. Here it is described that the subject is able to understand the problem written in TPM 1 and TPM 2 using their own language in accordance with what is understood in the questions, but does not change the aims and objectives asked in TPM 1 and TPM 2 questions. Based on this description it can be seen that at the stage of understanding the

problem the subject has performed his/her abilities in understand a given problem.

At the stage of making plans to determine the area and costs asked here the subject uses his knowledge and understanding of flat shapes. Yuwono (2018:142) in the planning stage, students need previous knowledge to carry out strategies that make it easier to solve the problems given. Here it can be seen when ST uses a strategy by describing what is known in the problem and ST is able to explain the solution plan he used with appropriate reasons to solve the problem in the TPM problem given.

At the stage of carrying out the subject solving, you can determine the steps that will be taken from the start to find the area in question. Then after searching the subject area, find out how much it costs. Here the subject is able to solve both TPM 1 and TPM 2 story problems with the correct methods and results and fulfills what is asked in the questions. Based on research conducted by Yuwono (2018: 142), in implementing the plan, students are said to have reached this stage if the student has carried out the calculation process according to the plan he has prepared based on the questions asked.

In checking the answers again, the subject feels confident with the answers he has done. However, the subject still checks the answer again by checking the question again and checking each step in the solution. The subject provides an explanation of the answers to both TPM 1 and TPM 2. Then provides a conclusion from the answer that the subject has completed, this is in accordance with Yuwono (2018:142) in looking back at the results of their work, students are said to be able to carry out this stage if the student is able to make conclusions from the results of their work and students are able to write them down.

The four stages above show that ST subjects who have high mathematical abilities can understand the problem given, plan a solution, carry out the solution and recheck the answers that ST has worked on, where the answers that ST produces are all correct. In line with Afandi's research (2017: 7) that subjects with high mathematical abilities in solving story problems are able to express the information contained in the problem completely, state what is known and asked correctly (equivalent to interpretation indicators), identify relationships between statements (equivalent to analysis indicators), explaining how to solve problems correctly and drawing conclusions along with the reasons (equivalent to indicators of evaluation, inference and explanation), and being able to check back the results of their work thoroughly and precisely (equivalent to indicators of self-regulation)

At the stage of understanding the problem in the form of a story problem to determine the area of the road and the cost asked in the SS subject question, read the sentence carefully and more than once. In line with Widarti's research (2013:6), MNR subjects read the questions three times. The MNR subject gave the reason why he read the

question repeatedly three times, namely to ensure that the information he had read was not wrong. Here it is described that SS is able to show things that are known in the questions and is able to express the problems written in TPM 1 and TPM 2 using his own language according to what the subject understands in the questions but does not change the aims and objectives asked in TPM 1 and TPM 2. Yuwono (2018:142) in the stage of understanding the problem, students are said to have reached this stage if students know what they know and are asked questions correctly.

At the stage of making plans to determine the area and costs asked here the subject uses his knowledge and understanding of flat shapes. Yuwono (2018:142) in the planning stage, students need previous knowledge to carry out strategies that make it easier to solve the questions given. Here it can be seen when SS uses a strategy by describing what is known in the problem and SS is able to explain the strategy used with appropriate reasons to solve the problem in the TPM question given.

At the stage of carrying out the solution to determine the area and cost required, SS used his ability to analyze by describing the concept of his own knowledge, namely by finding the total area of what was asked and then subtracting the initial area, but the subject experienced an error in working out where the initial length and width should be. plus 2 by SS only plus 1 m. Here it can be seen that when carrying out SS solutions, you only look at what is known in the problem, do not look at the pictures included and are not careful in doing it. Pramono (2017:141) in teaching problem solving, understanding concepts is very necessary, then proceed with problem solving exercises.

In rechecking, the subject rechecks the answers by checking the questions and question requests again and checking each step of the answer. SS feels confident that the solution is correct because what was asked in the question has been fulfilled and SS provides a valid conclusion regarding the results of his work. Yuwono (2018:142) in looking back at the results of their work, students are said to be able to carry out this stage if the students are able to draw conclusions from the results of their work and the students are able to write them down.

From the four stages above, it was found that SS subjects who had moderate mathematical abilities were able to understand the problems given even though in understanding the SS questions they read them more than once and also asked the researchers. In the stage of making a solution plan, SS was quite good, although there were still several questions asked by SS to researchers. At the stage of working on the solution, SS experienced a conceptual error, this was caused by SS's lack of thoroughness in describing the content of the problems in TPM 1 and TPM 2, SS only listened to directions from the researcher. This is in accordance with the results of Aini's research (2017: 18) which states that one of the difficulties students have in

solving math problems in the form of stories is in modeling story problems in mathematical form or images that have meaning related to the problem given. In the stage of re-checking answers, SS was good because he read and re-checked the answers and was able to provide conclusions on the results of his work.

At the stage of understanding the problem in the form of flat-rise story questions to determine the area and cost asked, the subject read the questions not only once. In line with Arif Widarti (2013:6) MNR subjects read the questions three times. The MNR subject gave the reason why he read the question repeatedly three times, namely to ensure that the information he had read was not wrong. Here SR can show what is known in the question and is able to express the problems in the question using his own language without changing the aims and objectives asked in the TPM question.

At the stage of making a plan to determine the road area and costs asked here, the SR subject uses his abilities and understanding of flat shapes. The subject was a little less confident in his understanding in carrying out the solution plan by asking the researcher whether his statement was correct or not, because based on previous knowledge the subject felt that to find the area of a flat shape the way the subject said. In line with Yuwono (2018: 142), in the planning stage, students need previous knowledge to carry out strategies that make it easier to solve the questions given. Here it can be seen that the SR subject is able to collect the facts in the TPM and then determine steps to solve problems in TPM 1 and TPM 2.

At the stage of carrying out the solution to determine the area asked for in TPM 1 and TPM 2, SR uses its ability to find the area of a flat shape. However, subject SR experienced an error in finding the total area of TPM 1 and TPM 2 where the length should be + 2 m and width + 2 m. Subject SR did it by finding the known area and then adding it to the known width of the road in TPM 1 and TPM 2 The error started from this, so SR completed the TPM with an answer that was not correct. To find the costs required, the method is correct, but because the road area searched in the first step, the answer is not correct, the answers completed by SR are all wrong. Pramono (2017:141) in teaching problem solving, understanding concepts is very necessary, then proceed with problem solving exercises.

In checking the answers that had been completed, SR felt unsure about the answer, but after checking the results of his work, SR felt confident about the solution because it was in accordance with his understanding and SR provided a conclusion from which the solution was requested by TPM, both TPM 1 and TPM. 2 are all fulfilled even though the answer is wrong. In accordance with Yuwono (2018:142) when looking back at the results of their work, students are said to be able to carry out this stage if the students are able to draw conclusions from the results of their work and the students are able to write them down.

From the four stages above, it was found that SRs who had low mathematical abilities were able to understand the problem given, even though in order to understand SR they had to read the TPM questions several times and also ask the researcher about what SR knew about the questions. In the process, SR was confused, but After being given an overview by the researcher, SR understood the steps, in the stage of working on solving SR, they also experienced conceptual errors, this was caused by SR's lack of understanding in describing the content of the problems in TPM 1 and TPM 2. SR only listened to directions from the researcher. This is in accordance with the results of Aini's research (2017: 18) which states that one of the difficulties students have in solving math problems in the form of stories is in modeling story problems in mathematical form or images that have meaning related to the problem given.

PENUTUP

Based on the data presentation and research findings, the following conclusions were obtained.

1. Profile of ST Subjects' Ability in Solving Story Problems in Flat Figures

At the stage of understanding the problem, ST identifies the things in the problem through his own understanding and is able to explain them using his own language so that ST is able to show what elements are known and asked correctly. At the stage of making a problem solving plan, ST subjects use their knowledge and understanding of flat shape concepts. In carrying out problem solving, ST uses his ability to analyze by explaining the concept of finding the area of a flat shape. In TPM 1 and TPM 2, the subject is able to apply the concepts to work on flat shape problems, although there are slight differences, but the process is both correct. In checking the results of the answers obtained, ST feels confident with the answers, but to be more convincing, ST re-checks the questions and answers as well as any requests in the questions, then ST is asked to conclude.

2. Profile of SS Subjects' Ability in Solving Story Problems in Flat Figures

At the stage of understanding the problem, ST identifies the things in the problem through his own understanding by reading the problem more than once and being able to explain it using his own language so that ST is able to show what elements are known and asked correctly. At the stage of making a problem solving plan, SS uses his knowledge and understanding of problems related to flat shapes, which can be seen when SS describes everything he knows in the problem. In carrying out the solution, SS uses his own understanding in working on problems in the form of stories related to flat shapes, where according to SS, to find the area of the road he is looking for, he adds the known width of the road to the known length and width of the object. In TPM 1 and TPM 2 SS was able to apply the concept but the subject experienced errors in finding the total area. When checking the results of the answers obtained, SS felt unsure about the answer, but after being asked

to check the answer again and whatever was asked for in the question, SS felt confident about the answer and could conclude it.

3. Profile of SR Subjects' Ability in Solving Story Problems in Flat Figures

At the stage of understanding the problem, SR can understand the problem given, although to understand SR you have to read the TPM questions more than once and also ask the researcher about what SR knows about the questions. In the stage of making a solution plan, the concept used by SR experienced an error. In the steps of working on SR, I was confused, but after being given an overview by the researcher, SR understood the steps. In the stage of working on solving SR, I also experienced conceptual errors, this was caused by SR's lack of understanding in describing the content of the problems in TPM 1 and TPM 2. SR only listened to directions from researcher. At the stage of re-checking the answers, SR felt confident with the answers that SR gave because they were in accordance with his understanding, but he still had to re-check the results of his answers and answer the conclusions requested by the researcher.

DAFTAR PUSTAKA

Aini, S. D., Jannah, U. R., & Masruroh, R. (2017). Identifikasi Kesalahan Siswa dalam Menyelesaikan Masalah Trigonometri. Jurnal SIGMA, 3(1), 17–25.

Ani, E, U. & Rahayu, P. (2017). Profil Kemampuan Pemecahan Masalah Matematika Siswa Berbentuk Soal Cerita Materi Bangun Ruang. Jurnal Riset Pendidikan dan Inovasi Pembelajaran Matematika, 1 (1): 42-44.

Anisa, Witri N. (2014). Peningkatan Kemampuan Pemecahan Masalah dan Komunikasi Matematik Melalui Pembelajaran Pendidikan Matematika *Realistic* Untuk Siswa SMP Negeri Di Kabupaten Garut. (Online), 1 (1): 4.

Arikunto, Suharsimi. (2013). Prosedur Penelitian Suatu Pendekatan Praktik. Jakarta: Rineka Cipta.

Asmana, A, T. (2018). Profil Komunikasi Matematika Tertulis dalam Pemecahan Masalah Matematika di SMP ditinjau dari Kemampuan Matematika. Jurnal Inovasi Pendidikan dan Pembelajaran Matematika, 4 (1): 3.

Isroil, A, Budayasa, K, & Masriyah. (2017). Profil Berfikir Siswa SMP dalam Menyelesaikan Masalah Matematika ditinjau dari Kemampuan Matematika. *Jurnal riview* Pembelajaran Matematika, 2 (2): 95.

Laily, I. F. (2014). Hubungan kemampuan membaca pemahaman dengan kemampuan memahami soal cerita matematika sekolah dasar. Eduma: *Mathematics Education Learning and Teaching*, 3 (1): 56.

Listanti, D, R, & Mampouw, H, L. (2020). Profil Pemecahan Masalah Geometri Oleh Siswa Smp Ditinjau dari Perbedaan Kemampuan Matematika. Cendikia (Jurnal Pendidikan Matematika), 4 (1): 366.

Maulidia, Qoriatul Qomariyah. (2018). Profil Kemampuan *Representasi Matematis* Siswa dalam Memecahkan Masalah Trigonometri Berdasarkan Kemampuan

Matematika. Universitas Madura. (Skripsi Tidak Dipublikasikan).

Oktaviana, D. (2017). *Analisis* tipe kesalahan berdasarkan teori newman dalam menyelesaikan soal cerita pada mata kuliah matematika diskrit. Edu *Sains*: Jurnak Pendidikan *Sains* & Matematika, 5 (2): 22-31.

Pramono, A. J. (2017) Aktivitas Metakognitif Siswa SMP dalam Pemecahan Masalah Matematika Berdasarkan Kemampuan Matematika. Jurnal Matematika Kreatif-Inovatif, Kreano 8 (2) : 133-142

Sahrudin, Asep. (2016). *Implementasi* Model Pembelajaran *Means-Ends Analysis* Untuk Meningkatkan Kemampuan Pemecahan Masalah Matematika Mahasiswa. (Online), 4 (1).

Sariningsih, R., & Purwasih, R. (2017). Pembelajaran *Problem Based Learning* Untuk Meningkatkan Kemampuan Pemecahan Masalah *Matematis* dan *Self Efficacy* Mahasiswa Calon Guru. JNPM (Jurnal Nasional Pendidikan Matematika), 1 (1): 163-177.

Widarti, A. (2013) Kemampuan Koneksi Matematis Dalam Menyelesaikan Masalah Kontekstual Ditinjau dari Kemampuan Matematis Siswa. Jurnal Pendidikan Matematika, 2013 - academia.edu

Yuwono, T, Supanggih, M, & Ferdiani, R. D. (2018) Analisis Kemampuan Pemecahan Masalah Matematika dalam Menyelesaikan Soal Cerita Berdasarkan Prosedur Polya. Jurnal Tadris Matematika, 1 (2): 142.

Sekretariat Redaksi
INTERAKSI: Jurnal Kependidikan
Publisher: Fakultas Keguruan dan Ilmu Pendidikan Universitas Madura.
Alamat: Jalan Raya Panglegur KM 3,5 Pamekasan, Indonesia 69371 (Gedung FKIP UNIRA).
E-mail: interaksi@unira.ac.id