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HOW GRADE VIII MIDDLE SCHOOL STUDENTS CAN SOLVE PROBLEMS CONSTRUCTING FLAT SIDED ROOMS WITH POLYA STAGES

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Solving Problems Constructing Flat Sided Spaces with Polya Stages for Middle School Students

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Abstract

The purpose of this study was to determine the mathematical problem solving abilities of students with polya stages in solving problems related to flat sided geometric material. The method used in this type of research is descriptive qualitative. The population in this study were class VIII students of junior high school. Selection of samples with purposive sampling selected 6 people at high, medium and low levels. Data collection techniques in the form of tests, interviews and documentation. This study shows the results that in completing mathematical problem solving abilities to solve mathematical problems in the material of flat sided geometric shapes explain that the subject's answers vary greatly, at high, medium, low level subjects. Students with high mathematical ability (S1) did not make mistakes on the indicator aspect, students with medium mathematical ability (S2) made a few mistakes on the indicator aspect with the problem identification stage and students with low mathematical ability (S3) made mistakes on the indicator aspect with the completion stage problem and rechecking, it shows that S3 is faultier.

Key words: problem solving ability, polya stages, flat side shapes.

Abstrak

Tujuan penelitian ini untuk mengetahui kemampuan pemecahan masalah matematis siswa dengan tahapan polya dalam menyelesaikan masalah yang berkaitan dengan materi bangun ruang sisi datar. Metode yang digunakan dalam jenis penelitian ini adalah deskriptif kualitatif. Populasi pada penelitian ini yaitu siswa kelas VIII SMP. Pemilihan sampel dengan *purposive sampling* dipilih 6 orang pada tingkat tinggi, sedang dan rendah. Teknik pengumpulan data berupa tes, wawancara dan dokumentasi. Penelitian ini menunjukan hasil bahwa dalam menuntaskan kemampuan pemecahan masalah matematika untuk menyelesaikan masalah matematika pada materi bangun ruang sisi datar menjelaskan bahwa jawaban subjek sangat beragam, pada subjek tingkat tinggi, sedang, rendah. Siswa dengan kemampuan matematika tinggi (S1) tidak melakukan kesalahan pada aspek indikator, siswa dengan kemampuan matematika sedang (S2) melakukan sedikit kesalahan pada aspek indikator dengan tahap mengidentifikasi masalah dan siswa dengan kemampuan matematika rendah (S3) melakukan kesalahan pada aspek indikator dengan tahap menyelesaikan masalah dan memeriksa kembali, hal ini menunjukkan bahwa S3 lebih banyak tingkat kesalahannya.

Kata kunci: kemampuan pemecahan masalah, tahapan polya, bangun ruang sisi datar.

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Pendahuluan

In implementing the learning process in class, many students experience problems and obstacles in the process of learning mathematics. This is in accordance with what Russefendi stated (Novitasari, 2016) that there are many children after learning simple mathematics, many do not understand, and many concepts are misunderstood. Mathematics is considered a difficult and deceptive science (Poerwanti & Marmoah, 2021). In fact, the failure factor in learning mathematics is caused by the number of students who misunderstand mathematical concepts. This condition is called learning obstacle.

One of the mathematical abilities that must be possessed by students is the ability to solve problems (Umam et al., 2019). Mathematical problem solving abilities can support the potential of students in providing solutions to problems experienced by students in the learning process. According to (Hidayat, Wahyu; Sariningsih, 2018) problem-solving skills are needed in solving mathematical problems, this can be measured using steps such as activities to understand the problem, activities to plan or design problem-solving strategies, activities to carry out calculations and activities to check the correctness of the results. or solution. This is also in line with (Rahmazatullaili et al., 2017) which states that, with problem solving abilities can develop students' thinking skills, because the process of learning mathematics is basically problem solving and needs to relate the material being studied to existing problems in everyday life and create ideas or ideas in various ways (Fatayan et al., 2023). With the ability to solve problems, it is expected that students can become independent in solving problems in their own way.

The subject of the flat side shape is the subject given in class VIII SMP. This subject is one of the topics that students find difficult and students often make mistakes in solving problem-solving questions related to this material (Atiqoh, 2019). Building space is one of the geometric materials that includes abstract concepts that are difficult for students to understand. This is in accordance with the intellectual development of children stated by Jean Piaget (McLeod, 2018) that grade VIII students of junior high school are still at the concrete operational level so that they will have difficulty understanding abstract mathematical concepts.

Kajian Teori

Problem solving is so important for learning mathematics. By getting used to students being faced with the problems they face, these students will get used to using their mindset so that they can help the person's success in solving everyday life (Sundayana, 2018). According

to (Hidayat, Wahyu; Sariningsih, 2018) problem solving is the core of learning which is a basic ability in the learning process. To improve problem solving skills, it is necessary to develop skills in understanding problems, making mathematical models, solving problems and interpreting.

Problem solving ability is one of the most important abilities possessed by students. According to (Ulya, 2016) problem-solving ability is the ability to apply previously acquired knowledge to new situations that involve higher-order thinking processes. According to Surya (Amam, 2017) suggests that problem-solving ability is the ability of students to be able to understand problems through identifying elements that are known, asked, and the adequacy of the required elements, creating or developing strategies for solving and representing, choosing or implementing strategies to get solution and check the correctness of the solution and interpret it. According to Polya (Sumartini, 2016) suggests that to solve a mathematical problem there are four indicators that can be carried out, namely: understanding the problem, planning the solution, solving the problem according to plan, re-examining procedures and results of settlement.

Based on the description above, it can be concluded that mathematical problem solving ability is the thinking ability of students who are directed to understand a problem by identifying known elements, making mathematical models or patterns, compiling and managing solving strategies, implementing strategies that have been made in the previous step, and evaluate the results that have been obtained in answering a problem (Sugiyono, 2015). Thinking is a process so problem solving can be seen as a process. Thus, the process of students in obtaining answers in problem solving is more concerned than the answers. This includes indicators of understanding the problem, developing a plan, carrying out the plan, and checking again.

Metode Penelitian

The method used in this study is called qualitative, with a qualitative descriptive approach. This study aims to determine the ability to solve problems in the material Flat Sided Room Building Class VIII students. The research was conducted at a private junior high school in Kab. Sukabumi, with a population of all VIII grade students at the school totaling 48 students. The subjects in this study consisted of 6 students of class VIII with a high level of mathematical ability as many as two students, as many as two students, and low as many as two students. Students with high mathematical abilities are coded S1, students with moderate

mathematical abilities are given S2 codes, students with low mathematical abilities are given S3 codes.

The selection of subjects was carried out using a non-probability sampling technique with purposive sampling. According to (Sugiyono, 2019) purposive sampling is a sampling technique for data sources with certain considerations. Furthermore, the researcher conducted observations and interviews with 6 students based on the results of the completion that had been done to be able to find out whether the student's work was in accordance with the polya stages on the subject of flat sided geometric shapes.

Hasil dan Pembahasan

After doing the research, the researcher got the following results:

Students with high mathematical ability (S1)

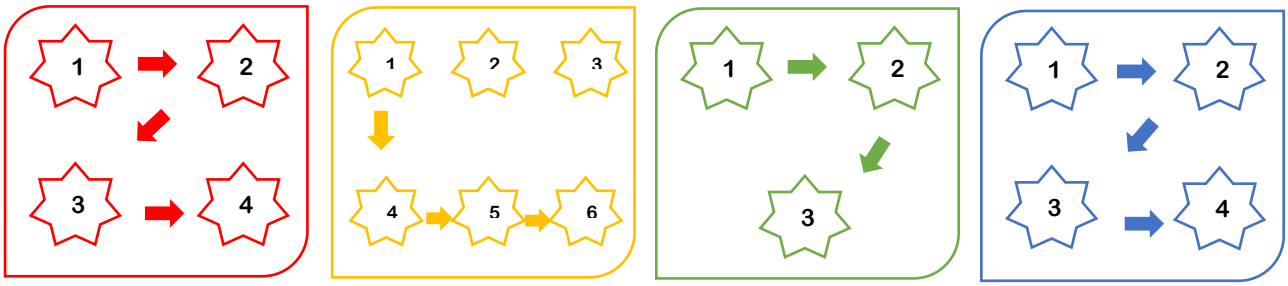

Figure 1. Hasil Jawaban siswa dengan kemampuan matematika tinggi

The results of students' answers in the category of high mathematical abilities in solving flat-sided geometrical problems can be seen in Figure 1, that the S1 did all the steps on the Polya indicator. The first indicator, namely understanding the problem, can be seen from the S1 answer sheet by understanding the questions, identifying and writing down what is known and what is being asked, meaning that students can understand the problems in the questions. Then in the second indicator it can be seen that students can plan to solve problems by writing the concept of the flat side shape formula. Furthermore, the third indicator is solving problems according to plan, it is clear that students can solve problems using formulas in problem planning. And the fourth indicator is checking again, it can be seen that students write conclusions according to the questions in the questions correctly. S1 fulfills the 4 indicators of problem solving properly and thoroughly. Agree with Simamora (2022) stating that students with high abilities do it confidently, thoroughly and are responsible for the results that have been done on the questions. Students can be said to be able to solve or solve a problem if they have been able to carry out the four problem solving steps described by Polya (Noviantii et al.,

2020). Overall students can solve problems using Polya stages. Solving problems using the Polya stages makes it easier for students to solve problems (Aliah et al., 2020).

Siswa dengan kemampuan matematika sedang (S2)

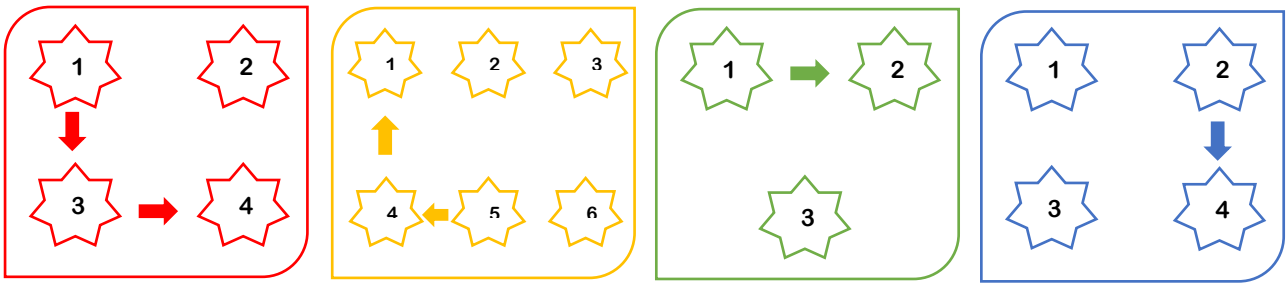

Figure 2. Hasil Jawaban siswa dengan kemampuan matematika sedang

The results of students' answers in the category of moderate mathematical abilities, in solving the problem of flat side shapes can be seen in Figure 2, in Figure 2 above the answers of Masters students there is no significant difference in the steps to solving the problem. Masters students have also taken steps that are in accordance with polya (Hidayat et al., 2019; Netriwati, 2016; Pirmanto et al., 2020). In the indicator of understanding the problem, students first read the questions that have been given. Then students immediately look for or collect information in the problem. Then in the second indicator, students immediately write down the information in the problem (known and asked). In the third indicator, students have started looking for formulas, as asked in questions using the concepts of lines and angles. After remembering the formula, students can start looking for the area of the geometric shape. In the last indicator, students re-check, adjust the data in the questions with what they wrote on the answer sheet, then re-calculate and ask the teacher for corrections.

Siswa dengan kemampuan matematika rendah (S3)

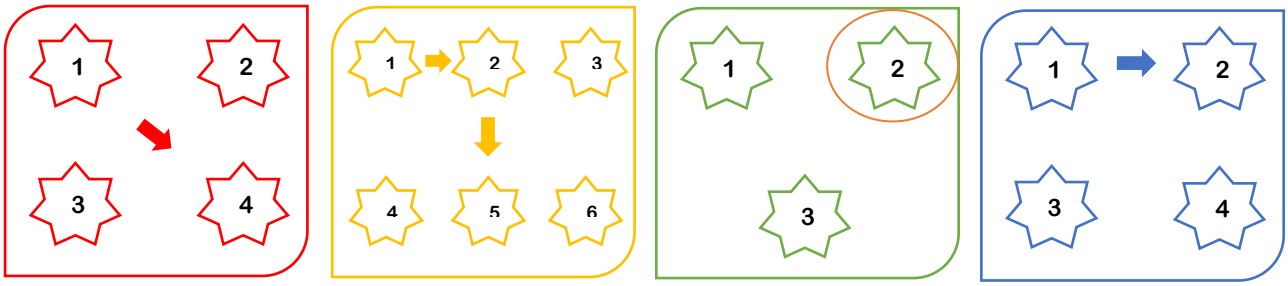

Figure 3. Hasil Jawaban siswa dengan kemampuan matematika rendah

The results of students' answers in the low math ability category in solving flat-sided geometrical problems can be seen in Figure 3. In Figure 3 above, the doctoral student's answers did all the steps on the Polya indicator, but there were several indicators that were done wrong or not quite right. The first step that students do is read the questions and look at the pictures listed on the questions. In the second indicator students write down what is known, asked questions. The third indicator, students work on questions without knowing what concept they are working on and students immediately collect the results of their answers to the teacher.

Kesimpulan

Based on the results of data analysis and discussion, it can be concluded that Grade VIII students of junior high school in completing their mathematical problem solving skills to solve mathematical problems on the flat sided geometric material explained that the subject's answers varied greatly, at high, medium, low level subjects. S1 did not make any mistakes on the indicator aspect, S2 made a few mistakes on the indicator aspect with the problem identification stage and S3 made mistakes on the indicator aspect with the problem solving and re-checking stage, this shows that S3 has more error levels.

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