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Unveiling the Problem-Solving Skills of 5th Graders: A Deep Dive into Fraction Mastery in Mathematics

Pebri Yanti[1], Nadya Sheilla Hamzah[2], Reni Kusmawati[3], Cucun Sutinah*[4]
[1,2,3,4]Pendidikan Guru Sekolah Dasar, IKIP Siliwangi. Cimahi, Jawa Barat
pebriyanti779@gmail.com, nadyasheillahamzah@gmail.com, renik2210@gmail.com, cs@ikipsiliwangi.ac.id*

ABSTRAK. Kemampuan pemecahan masalah merupakan keterampilan penting yang harus dimiliki siswa untuk menyelesaikan permasalahan matematika, khususnya pada materi pecahan, melalui empat tahapan utama: memahami masalah, merencanakan penyelesaian, menyelesaikan masalah, dan memeriksa hasilnya. Tujuan penelitian ini adalah untuk menganalisis kemampuan pemecahan masalah matematika siswa kelas 5 pada materi pecahan menggunakan metode ex post facto. Data diperoleh melalui tes kemampuan pemecahan masalah berbentuk uraian yang terdiri dari 8 soal. Hasil penelitian menunjukkan bahwa rata-rata siswa dapat memecahkan masalah matematika dengan baik, dengan tahap memahami masalah berada pada kategori sangat tinggi, sementara tahap melaksanakan strategi pemecahan masalah berada pada kategori rendah. Secara keseluruhan, meskipun siswa mampu memahami masalah dengan baik, kemampuan mereka dalam melaksanakan rencana penyelesaian masih

Corresponding Author: cs@ikipsiliwangi.ac.id

tergolong sedang, yang menunjukkan adanya kesulitan dalam menerapkan strategi pemecahan masalah secara efektif. Berdasarkan hasil ini, dapat disimpulkan bahwa kemampuan pemecahan masalah siswa bervariasi, dengan banyak siswa yang masih membutuhkan penguatan dalam mengimplementasikan strategi penyelesaian masalah.

Kata Kunci: Pecahan, Pemecahan Masalah, Sekolah Dasar

ABSTRACT. Problem-solving skills are essential competencies that students must possess in order to solve mathematical problems, particularly on the topic of fractions, through four main stages: understanding the problem, planning the solution, solving the problem, and checking the results. The purpose of this study is to analyze the mathematical problem-solving abilities of fifth-grade students on fraction topics using the ex post facto method. Data were collected through a descriptive problem-solving test consisting of 8 questions. The results of the study indicate that, on average, students are able to solve mathematical problems effectively, with the understanding of the problem being categorized as very high, while the implementation of problem-solving strategies is categorized as low. Overall, although students are able to understand the problem well, their ability to implement the solution plan is still considered moderate, indicating difficulty in effectively applying problem-solving strategies. Based on these findings, it can be concluded that students' problem-solving abilities vary, with many students still needing reinforcement in implementing solution strategies.

Keywords: *Fraction, Problem Solving, Elementary School.*

INTRODUCTION

Mathematics is a discipline with its own distinct characteristics. In this context, mathematics includes both direct and indirect objects (Dewi et al., 2019). The direct objects of mathematics consist of facts, skills, concepts, and mathematical principles (Maesari et al., 2020), while indirect objects include learning transfer, inquiry skills, problem-solving abilities, and an appreciation for the structure of mathematics (Verschaffel et al., 2020). Mathematics is a mandatory subject at every level of primary education. Mathematical instruction is defined as a learning experience provided to students through a series of planned and systematic activities. The main goal is for students to acquire knowledge of mathematics in a skilled, intelligent manner, and to fully understand the material taught by their teachers (Argawi & Pujiastuti, 2021). The aim of mathematics education is to enhance students' critical, analytical, logical, and creative thinking skills through problem-solving processes (Anugraheni, 2020).

In primary education, the goal of mathematics instruction is to prepare students' thinking patterns, enabling them to solve various problems encountered in everyday life (Nengsih et al., 2019). One of the topics taught at the primary level is fractions. Fractions, which are part of algebra, involve four mathematical operations: addition, subtraction, multiplication, and division (Suardi et al., 2022). A fraction consists of two components: the numerator and the

denominator, where the numerator has a smaller value than the denominator. Fractions can be represented by the letter "a" as the numerator and "b" as the denominator.

Problem-solving skills are essential for students to effectively engage in the learning process. The core foundation of mathematics education lies in how students approach problem-solving (Andita & Taufina, 2020). The purpose of teaching mathematics is to train and equip students to solve problems they encounter, thereby fostering the development of a superior generation in the future (Meilani & Maspupah, 2019). Each student has their own method for solving problems, which can be observed through their actions when addressing a problem, as well as how they consistently observe and process information. These aspects demonstrate that each individual has a distinct mindset, characterized by unique patterns that cannot be generalized across others.

Problem-solving abilities vary among students. Previous studies have shown that students' problem-solving skills are generally categorized as good when taught using the Problem-Based Learning (PBL) model (Suryani et al., 2020). However, other research has revealed that the most common error occurs at the "understanding the problem" stage, where students struggle to comprehend problems related to social arithmetic (Andayani & Lathifah, 2019).. Similar research also indicates that students often face

difficulties in problem-solving, necessitating more practice (Barus & Hakim, 2020).

Based on these findings, it can be concluded that problem-solving abilities vary widely among students. Therefore, although there have been studies analyzing the mathematical problem-solving abilities of fifth-grade students on fraction topics, this study aims to further investigate the extent of primary school students' problem-solving abilities, specifically in the area of fractions.

METHOD

The purpose of this study is to analyze the problem-solving abilities of fifth-grade students in mathematics, specifically on the topic of fractions. This study does not involve any treatment or intervention, but rather seeks to explore and analyze the existing data. Therefore, the approach used in this study is the ex post facto method. According to Sappaile & Makassar (2020), the ex post facto research approach is an effective method for providing valuable information to inform decision-making in the field of education. Ex post facto research is a type of study where the independent variable has already occurred prior to the study, and no treatment is applied during the research process (Danuri & Maisaroh, 2019).

The study was conducted at a public elementary school in Cimahi Utara District, involving 28 fifth-grade students as research subjects. The instrument used to

measure the students' problem-solving abilities in mathematics was a descriptive test consisting of 8 questions. The test was administered to the students with a time limit of 60 minutes. After the test was completed, the students' responses were collected and subsequently analyzed. The collected data were analyzed using descriptive quantitative methods to provide a clearer picture of the students' mathematical problem-solving abilities on the topic of fractions.

RESULT AND DISCUSSION

Problem-solving skills are essential for students in addressing problems, particularly in the context of mathematics, which emphasizes the use of methods, procedures, and strategies that can be systematically demonstrated (Rahmatiya & Miatun, 2020). In this study, students' mathematical problem-solving abilities were measured through a test consisting of 8 questions. The topic covered in this test was fractions, as taught in the fifth grade of elementary school. The problem-solving test was administered to students who had already participated in lessons on fractions. The following presents the data obtained from the problem-solving test.

Tabel 1. Problem-Solving Ability Data

No	Indicator	Response (%)
1	Understanding the problem	83,9

2	Planning the problem-solving strategy	75,0
3	Implementing the problem-solving strategy	66,0
4	Rechecking the results	71,4
	Average	74.1

Based on Table 1, it can be observed that the problem-solving ability of grade 5 students on the topic of fractions shows relatively good results, with an average of 74.1% of students being able to solve mathematical problems. This indicates that most students have acquired basic problem-solving skills. Mathematical problem-solving does not solely rely on theoretical knowledge, but also on the experience, skills, and understanding that students gain throughout the learning process. As stated by Sulhaliza, et al. (2023), problem-solving is a critical component in mathematics education because it enables students to apply their knowledge in more practical and contextual situations.

According to the analysis of the mathematical problem-solving ability based on Polya's procedure, the first stage analyzed was the understanding of the problem. The results indicate that students who completed the problems at this stage were in the very high category. According to Suendarti (Sagita et al., 2023), the understanding of the problem is a crucial first step, which involves accurately identifying and comprehending the core issue. At this stage, students are expected to identify relevant information and distinguish it from irrelevant elements in the problem. The

study shows that nearly all students mastered this stage well, which suggests that understanding the problem is an aspect that students excel at. This means that errors at this stage are relatively low, indicating that initial comprehension of the problem is a strength in the problem-solving process.

Next, at the second stage of Polya's procedure, the implementation of the problem-solving strategy, the analysis revealed that most students were categorized as low. The most common errors at this stage were caused by students' lack of precision in determining the steps to solve the problem. These errors often begin with mistakes made in the initial steps, which then affect subsequent steps, causing students to fail to direct their problem-solving efforts appropriately. According to Nurizlan, et al., (2022), errors in determining the solution steps at the beginning of the process significantly affect the subsequent resolution process, leading to mistakes in finding the correct solution. This indicates that while students may understand the problem, they encounter difficulties in planning and executing the solution effectively.

The mistakes made by students in implementing their plan are closely linked to errors from the previous stage, namely problem understanding. This finding aligns with the results of Fariha & Ramlah (2021), who stated that students often struggle at the implementation stage because they do not fully comprehend the problem presented. This lack of understanding prevents students from accurately outlining

their solution plan, thus hindering the progression of the problem-solving process. Therefore, even though students have mastered the understanding of the problem, the subsequent process requires more attention, particularly in the application of appropriate strategies.

Additionally, errors during the implementation of the plan are also influenced by students' lack of attention while solving the problems. In some cases, these errors are caused by students' rushed decision-making in search of a solution. As noted by Irianti (2020), students who do not execute their plan properly are often hindered by mistakes made at the initial stages of solving the problem. This prevents them from following the correct solution process, which eventually leads to errors in calculations or in determining subsequent steps. Therefore, it is crucial for students to pay careful attention to each step in the problem-solving process to avoid errors that could negatively impact the final results.

The variety of errors made by students during the problem-solving phase is often due to several factors, including carelessness and the tendency to rush through the problems. Students who are in a hurry often overlook crucial steps in the problem-solving process, leading to errors in calculation or strategy. As pointed out by Nurizlan, et al., (2022), students' low verbal abilities in interpreting information from the problem significantly impact their ability to simplify and understand it in a more straightforward

manner. Furthermore, limited mastery of the material and the desire to complete the task quickly also reduce the accuracy of the problem-solving strategy implementation.

CONCLUSION

Based on the research findings, it can be concluded that the mathematical problem-solving ability of grade 5 students on the topic of fractions shows a significant variation. The analysis of problem-solving ability using Polya's procedure indicates that students demonstrate a good understanding of the problem, as reflected in the first stage, "understanding the problem," which falls in the very high category. However, in the second stage, "implementing the problem-solving strategy," most students still face difficulties, which places them in the low category. The most frequent errors at this initial stage impact the smoothness of the subsequent steps taken by the students in their problem-solving process.

Students with strong problem-solving abilities generally show the capacity to accurately understand the problem, plan their solution steps effectively, draw correct conclusions from their calculations, and verify the solutions they obtain. In contrast, students with moderate problem-solving abilities tend to master only the first two stages—understanding the problem and planning the solution strategy—yet still struggle with the execution and verification stages. Errors made during the implementation of the

problem-solving strategy are often influenced by factors such as the desire to complete the task quickly, low verbal ability in converting the information in the problem into simpler mathematical expressions, and limited mastery of the material. These factors prevent students from executing the solution plan optimally, leading to errors in the problem-solving process.

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