Prima: Jurnal Pendidikan Matematika
Vol. 6, No. 2, July 2022, pp. 120-131
P-ISSN: 2579-9827, E-ISSN: 2580-2216
Web: http://jurnal.umt.ac.id/index.php/prima

MATHEMATICAL PROBLEM SOLVING ABILITY TO DEVELOP NUMERICAL LITERACY IN ELEMENTARY SCHOOL STUDENTS

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Abstract

Mathematical problem solving ability has a close relationship in developing literacy and numeracy in elementary schools. The purpose of this study was to describe mathematical problem solving abilities to develop literacy and describe mathematical problem solving abilities to develop numeracy in elementary schools. This research was carried out in class V SD Negeri Sibela Timur Surakarta City to students with a total of 3 students. The method used in this research is descriptive qualitative research method. Data collection was carried out with tests and documentation. The results of this study indicate that the ability of students to solve mathematical problems is different. Of the 3 students, 1 student has the ability to solve math problems in the good category, 1 student in the medium category, and 1 student in the low category. Mathematical problem solving ability is in line with the results of giving literacy and numeracy questions. Students in the good category get high literacy and numeracy test scores, students in the moderate category get sufficient test scores, and students in the low category get low literacy and numeracy test scores.

Keywords: math problem solving, numerical literacy, elementary school

INTRODUCTION

Education is an important aspect that determines the superiority and civilization of a nation. Education is the main factor in the formation and preparation of the nation's next generation as quality Indonesian human resources. The rapid advancement of information and technology encourages the education sector to continue to innovate for the betterment of the nation. One of the evaluations that we can use as a measure to see how the quality of the next generation of the Indonesian nation is is the 2018 PISA (Program for International Student Assessment) results. PISA (Program for International Student Assessment) is a study to evaluate a country's education system using reading, math, and science tests. The results of the 2018 PISA, namely Indonesia is in position number 74 out of 79 countries evaluated. This result is quite alarming because Indonesia is ranked 6th from the bottom. These results indicate that education in Indonesia has not been able to encourage students to use the information obtained to solve problems (Saputri et al., 2022).

Based on the results of the PISA, the government through the Ministry of Education and Culture carried out improvement efforts to improve the quality of education in Indonesia with evaluation steps. Thus starting in 2021 the Minister of Education and Culture of the Republic

Received: April, 2022; Revised: July, 2022; Accepted: July, 2022

of Indonesia stipulates that the national examination in grade 6 is not carried out, instead the AKM (Minimum Competency Assessment) is carried out. Minimum Competency Assessment is an assessment of basic competencies that are important for students to master. Minimum Competency Assessment measures the ability of learners in terms of literacy and numeracy.

The implementation of the Minimum Competency Assessment in 2021, for the first time, experienced several obstacles, including network constraints, inadequate availability of facilities and infrastructure, and student ability constraints. This ability constraint of students is because students are not used to working on literacy and numeracy questions which are included in the HOTS (High Order Thinking Skill) questions. The ability of students in terms of literacy and numeracy is still very low, so special attention is needed to improve it.

The literacy and numeracy abilities of students can be measured through the results of the Minimum Competency Assessment. The questions in the Minimum Competency Assessment are prepared by applying the HOTS questions, through these questions students are not only required to remember, understand, and apply, but students are invited to analyze, evaluate, and create. Thus, the questions given to students are no longer just answering simple questions, but students have been trained to develop their literacy and numeracy skills in solving problems.

Literacy itself is experiencing an expansion of meaning today. Literacy which used to mean reading and writing, in this era of super-fast technological and information advancement, the meaning of literacy has also expanded. In the past, literacy only consisted of reading and writing, but at this time it is developing coupled with literacy that examines data, technological literacy, and literacy related to humans. With the rapid development of technology and information, literacy has become the latest tool in creating a developed and superior country.

Numeration also undergoes an expansion of meaning such as literacy. In the past, numeration was only defined by counting. At this time, numeracy is not only limited to the ability to count, but also to the skills of students in mastering mathematical material and concepts, analyzing mathematical problems in everyday life, and being able to provide

solutions to mathematical problems encountered in the context of everyday life. . Rahmawati (2021) states how important it is to master literacy and numeracy by students who can encourage individuals, communities, and nations to be better. Based on this statement, it shows that literacy and numeracy encourage a person's abilities, so that they can develop their abilities to the maximum to become a more qualified person.

The development of students' literacy and numeracy skills can be done in learning mathematics. The content of mathematics lessons presents several problems in which there are literacy and numeracy components, so that mathematical problem solving abilities will train students to think critically and creatively. With problem solving skills, students are not only trained to remember mathematical formulas and concepts, but students are trained to analyze problems and find solutions to mathematical problems.

By solving problems, the literacy and numeracy of students will increase. This is as stated by (Maghfiroh et al., 2021) which states that mathematical problem solving is an ability where students are not only required to be skilled in using mathematical formulas and remember and memorize mathematical concepts, but students must be able to use mathematical material in solving problems in everyday life that they find. Meika(2021)also stated that mathematics learning achievement is still low due to many factors, one of which is the ability to solve mathematical problems of students who are still lacking.

Problem solving skills need to be taught to all students, so that students are accustomed to solving problems in the context of mathematics lessons and problems in everyday life that they encounter (Apriadi et al., 2021). The ability of students to solve mathematical problems is a very important ability, because mathematical problem solving abilities will build students' ability to solve problems (Novalia & Panjaitan, 2021). Based on this, it can be concluded that the ability to solve mathematical problems can develop literacy and numeracy skills. Mathematical problem solving ability has a great impact on the literacy and numeracy of students. Mathematical problem solving abilities can help students' thinking and reasoning patterns in solving literacy and numeracy problems.

Mathematics is one of the subjects that must be taught in elementary schools. In addition, for teachers when teaching mathematics to students has its own challenges. This is

because for some students, mathematics is a scourge or something that is feared or even avoided by students. For some students, mathematics is considered difficult. This is as stated by (Salvia et al., 2022), this phenomenon is known as math anxiety.

Mathematics anxiety is a feeling of fear, anxiety, and depression, which is accompanied by inaccuracies in solving problems and doing mathematical problem solving. Mathematics anxiety has a positive impact on a certain level, because with mathematics anxiety students will have the motivation to learn better and try to understand mathematical materials. However, at a certain level that exceeds the limit, math anxiety will make students unfocused and have difficulty in accepting mathematics subject matter.

Thus when teaching mathematics material, teachers must be able to provide learning that can attract the attention of students.(Novianti, 2021)states that the objectives of learning mathematics that are sourced from standard textbooks for mathematics subjects are: (1) Mathematics trains students in thinking and reasoning when concluding, (2) Mathematics is a fun activity that involves imagination and feeling challenged to experiment. , (3) Mathematics will train students in an effort to solve a problem, (4) Mathematics will improve students' ability to communicate and make presentations on the results of working on problems that have been done.

In improving students' numeracy literacy, teachers can provide challenges to try to deal with math problems and communicate problems on questions that are in accordance with the mathematical context (Salsabilla & Hidayati, 2021). The problem-solving process requires students to think critically and reason to connect the mathematical context with the phenomena of everyday life. Thus, the ability to solve mathematical problems helps students in mastering literacy and numeracy.

METHODS

Researchers used descriptive qualitative research methods to describe mathematical problem solving abilities to develop literacy and numeracy skills in elementary schools. The subjects in this study were 3 students in class V SD Negeri Sibela Timur.

Table 1. Research subjects

No	Initials	Student Code
1.	BSM	PD 1
2.	HSW	PD 2
3.	JF	PD 3

The purpose of this study was to describe mathematical problem solving abilities to develop literacy and describe mathematical problem solving abilities to develop numeracy in elementary schools. Data was collected by means of tests and documentation. The test was carried out to students, where the researcher gave 5 math description questions that required mathematical problem solving skills. So that through this test, it can be described how the ability of students to solve mathematical problems can be described.

RESULTS AND DISCUSSION

Table 2. Math Problems

No	Question
1.	Take a look at how to add fractions with different denominators below! a. $\frac{5}{7}+ = =\frac{2}{5}\frac{5+2}{7+5}\frac{7}{12}$ b. $\frac{5}{7}+ = + =\frac{2}{5}\frac{25}{35}\frac{14}{35}\frac{39}{35}$ c. $\frac{5}{7}+ = + =\frac{2}{5}\frac{5}{35}\frac{2}{35}\frac{7}{35}$ Based on the work above. Which do you think is the correct workmanship? And explain where the error of the other two works!
2.	Bambang will help Bima to solve the problem of adding fractions with different denominators. Bambang doesn't want to help by doing the problem, but by giving the steps. If you are invited by Bambang to discuss to arrange the steps on how to add two fractions with different denominators, then write down the correct order of steps!
3.	Why Fraction $\frac{3}{4}$ and can not be done by directly adding up? $\frac{3}{5}$
4.	Ririn worked on the problem of adding fractions as follows: $\frac{3}{4}+ =\frac{4}{5}\frac{7}{9}$ In your opinion, Ririn's answer is right or wrong? Give your reasons!
5.	If Budi has a meter rope, then buy another meter long rope. How long is Budi's rope now? $\frac{1}{4}\frac{1}{2}$

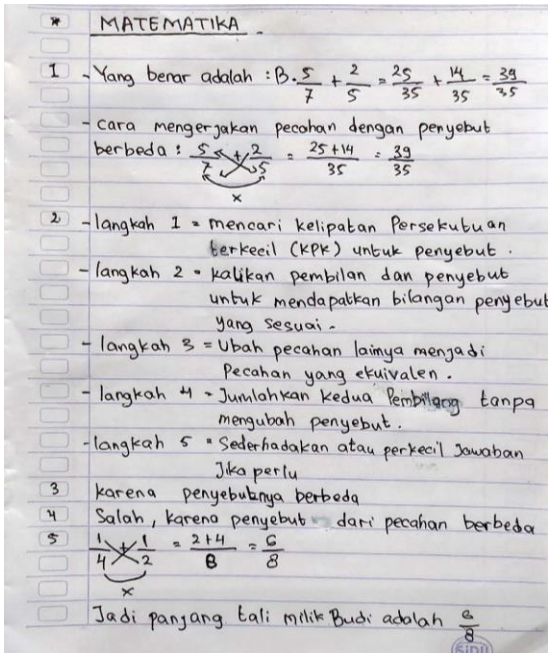

Figure 1: The results of working on the subject of PD 1

T : "In working on question number 1, how do you determine the right answer?"

PD 1 : “Which B, ma'am. Because in doing the addition of fractions we must first equate the denominators, ma'am.Then I tried to count on paper and the correct one was B, ma'am."

T : "What about A and C?"

PD 1 : “Which A is wrong, ma'am, because it is directly added between the numerator and denominator. Even though the addition of fractions can be added to the numerator if the denominator is the same. Then C is also wrong, because the denominator has been the same but the numerator has not been calculated. In C, the numerator is still the same, ma'am, so C is wrong."

T : "Okay, if the number is 2, how do you do it?"

PD 1 : "I wrote down my steps in doing the addition of fractions while remembering when I was working on number 1, ma'am. Step one and the next step I do according to the way I do addition and say fractions."

T : "So you don't memorize?"

PD 1 : "No, ma'am. I just remember how I did it and then I write down the steps.”

T :"Then for number 3, how do you understand question number 3, son?"

PD 1 : "Number 3 is easy, ma'am. It's true that the addition of fractions cannot be done directly. We have to equate the denominator first by looking for the KPK, ma'am. If the denominators are the same, then we can do it, ma'am."

T : "Well. Thank you. Continue yes, if number 4. Aare you confused?"

PD 1 : "No, ma'am. according to meit's like number 3, ma'am."

T : "So you immediately understand question number 4 and can immediately work on it?"

PD 1 : "*geez*, ma'am."

T : "About number 5 can you do it?"

PD 1 : "Yes, ma'am. It's just adding.Because Budi bought another one, the rope is getting longer, Mom."

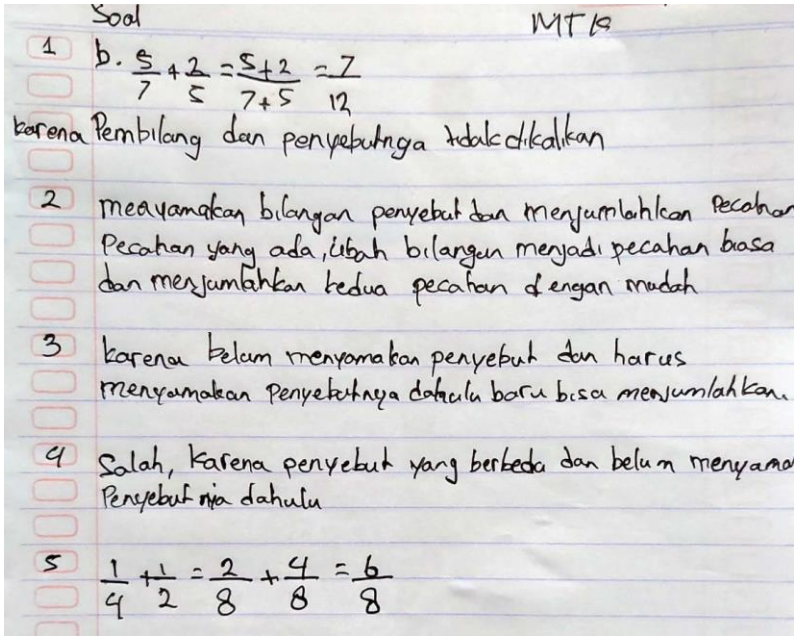

Figure 2: The result of working on the subject of PD 2

T : "In working on question number 1, how do you determine the right answer?"

PD 2 : "The B, ma'am", the numerator and denominator are not multiplied."

T : "There you write B, but what you write is A,*you know*."

PD 2 : "Oh, sorry, ma'am. I mean the correct one is A. If you add up, just add up, ma'am."

T :"Okay, be more careful in reading the questions. How about B and C?"

PD 2 : "Which B and C are wrong, ma'am, because there are so many answers."

T : "How much?"

PD 2 : "Yes, a lot, 5 plus 2 is 7, but that's 39, ma'am."

T : "Okay, if the number is 2, how do you do it?"

PD 2 : "Equate fractions and add up.”

T : "Equalize the fractions in what way?"

PD 2 : “Don't know, Mom, I am.”

T : "Then for number 3, how do you understand question number 3, son?"

PD 2 : "You have to make the denominator the same first, ma'am, then you can do it."

T : "How do you equate the denominator?"

PD 2 : "I don't know, ma'am."

T : "Then how come you can mention equating the denominator first?"

PD 2 : "Because the teacher often says that, ma'am. I got it memorized.”

T : "It means you memorized it, but you don't understand, do you?"

PD 2 : "Yes, ma'am."

T : "Well. Thank you. Continue yes, if number 4. Aare you confused?”

PD 2 : "No, ma'am. according to meit's like number 3, ma'am."

T : "So you immediately understand question number 4 and can immediately work on it?"

PD 2 : "*geez*, ma'am. But I can't do it, ma'am."

T : "About number 5 can you do it?"

PD 2 : "Yes, ma'am. It's just adding. Because Budi bought again, so the rope is getting longer, Mom.It's easy because the denominator is just multiplied, ma'am. If this I can do, because the numbers are small, ma'am."

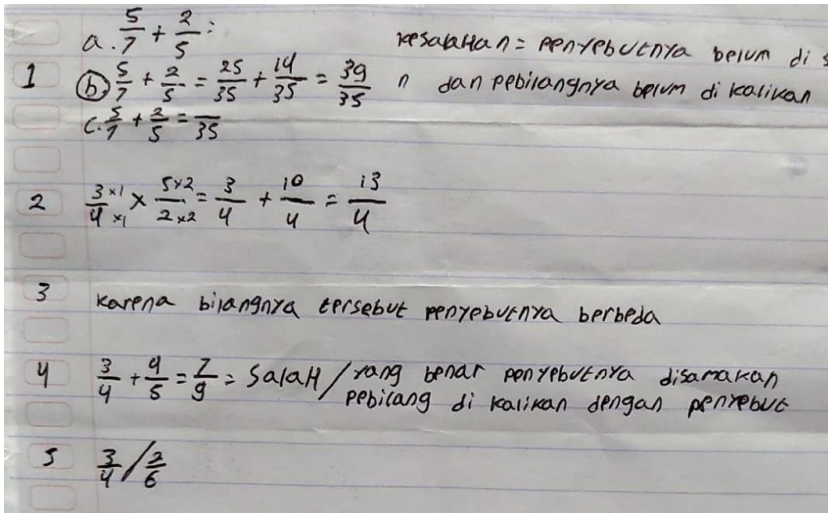

Figure 3: The result of working on the subject of PD 3

T : "In working on question number 1, how do you determine the right answer?"

PD 3 : “Which B, ma'am.If A and C are not the same, the denominators and the numerators have not been multiplied, ma'am."

T : "Okay, if the number is 2, how do you do it?"

PD 3 : "Number 2 I don't know how to teach, ma'am. I don't know the steps, ma'am."

T : "Then for number 3, how do you understand question number 3, son?"

PD 3 : "The teacher said that the denominators must be the same, ma'am."

T : "Well. Thank you. Continue yes, if number 4. Are you confused?”

PD 3 : "No, ma'am. I think it's like number 3, ma'am.The teacher often says that the denominators must be the same"

T : "So you immediately understand question number 4 and can immediately work on it?"

PD 3 : "Yes, ma'am."

T : "About number 5 can you do it?"

PD 3 : "No, ma'am. I don't understand the question, because the question is telling, it should be straight to the point, ma'am."

T : "Then where do you get the answer you wrote here?"

PD 3 : "I don't know, ma'am, I just wrote it down."

In the implementation of learning, the ability that is often used by students is literacy. This literacy ability is used in almost all subjects, in addition to literacy skills there are also numeracy skills which are usually honed in mathematics. The development of education encourages changes to solve problems in learning. Students usually carry out problem

analysis on questions using their literacy skills, but at this time questions are starting to appear that require understanding using literacy and numeracy understanding in solving problems. Problems that require literacy and numeracy can be found in mathematics. Mathematics learning can provide literacy and numeracy-based questions with various types of problems such as story questions (Winarso et al., 2022). The following is a table that describes the various problem solving abilities of fifth grade students at SD Negeri Sibela Timur, Surakarta City. There are 3 students who have different problem solving abilities.

Table 1. Student data

No	Initials	Student Code
1.	BSM	PD 1
2.	HSW	PD 2
3.	JF	PD 3

Table 2. The results of the first opportunity to work on math problems

No	Student Code	Mark
1.	PD 1	35
2.	PD 2	70
3.	PD 3	70

Table 3. The results of the second opportunity to work on math problems

No	Student Code	Mark
1.	PD 1	60
2.	PD 2	80
3.	PD 3	85

Based on the data obtained from the work of 3 students, it shows that there is a change in the results of the first table of values and the second table of values. Changes in the data occur after students repeat their work with the same questions. The results from the table above give us an idea that students need a process in solving problems. The processes

they carry out include understanding problems, analyzing, designing solutions, implementing solutions, and evaluating their work (Winarso et al., 2022).

Through learning mathematics, students are required to understand the problem as a whole. An understanding of the problems faced will determine the results of students' work. In solving mathematical problems, the mindset and skills of students will be encouraged to find solutions to these problems(Khairunnisa et al., 2020). Thus, students need to maximize the abilities they have including literacy and numeracy. With literacy and numeracy skills to understand problems, students have a greater opportunity to solve the problems at hand.

CONCLUSION

Mathematics is a subject that presents many structured problems. Thus, it is necessary to understand the mathematical problems presented. Through these questions, students will conduct a thorough analysis to get a solution. The processes that can be carried out include understanding the problem, conducting analysis, designing a solution, implementing the solution, and evaluating. All of these processes can be carried out using the literacy and numeracy skills of students. Based on these data, it can be concluded that mathematical problem solving abilities can develop students' numeracy literacy

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