

READING LITERACY: DIFFICULTY IN UNDERSTANDING PROBLEMS IN MATHEMATICAL PROBLEM SOLVING

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Abstract *Students' capacity to solve problems is impacted by their low reading proficiency. This study aimed to characterize how students' reading literacy affected their comprehension of problems, which is the initial step in problem solving. 39 elementary school pupils in the fifth grade served as the research subjects for the descriptive analysis research method. The data analysis results demonstrated that students with high category abilities could comprehend the meaning of problems when they were solving them, but they needed to be meticulous and deeply involved in the difficulties they were working on. Due to their limited capacity for issue interpretation, students in the medium and low category abilities were not yet able to answer problems as a whole.*

Keyword: Literacy, Reading Literacy, Mathematical Problem Solving

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Abstrak Literasi membaca siswa yang rendah mempengaruhi kemampuan siswa dalam menyelesaikan soal pemecahan masalah. Tujuan penelitian untuk mendeskripsikan pengaruh literasi membaca siswa terhadap kemampuan memahami masalah yang merupakan tahap pertama dalam pemecahan masalah. Metode penelitian yang digunakan adalah analisis deskriptif dengan subjek penelitian 39 siswa kelas V sekolah dasar. Hasil analisis data menunjukkan bahwa siswa dengan kemampuan kategori tinggi mampu memahami makna masalah pada soal pemecahan masalah, namun harus memiliki ketelitian dan pemaknaan yang mendalam pada soal yang dikerjakan. Sedangkan siswa dengan kemampuan kategori sedang dan rendah, belum mampu secara keseluruhan dalam menyelesaikan soal pemecahan masalah disebabkan rendahnya kemampuan pemaknaan soal atau rendahnya literasi membaca. literasi membaca mempengaruhi kemampuan pemecahan masalah matematis siswa. Dibutuhkan dukungan dari guru dalam menyiapkan perangkat pembelajaran untuk terlaksananya pembelajaran yang dapat membantu siswa dalam mengembangkan dan meningkatkan kemampuan pemecahan masalah matematisnya.

.Kata Kunci: Literasi, Membaca, Literasi Membaca, Pemecahan Masalah Matematika

A. INTRODUCTION

Reading is a talent that children must learn in order to open the door to the world of science and information. It also plays a vital role in daily life. Many research findings indicate that reading is critical and should be introduced early in learning since it is the key to getting knowledge and paving the way for learning all disciplines (Arif et al., 2021; Alneyadi et al., 2023; Arianto et al., 2024). Reading is a component of language skills; language allows pupils to translate early experiences that have not been processed after receiving additional knowledge into language symbols that may be used to communicate and think (Lailiyah, 2021; Pratiwi, 2021). The aim of reading.

Reading is closely tied to literacy, which was originally defined as the capacity to read and write. However, as people's perception of literacy has evolved, the definition of literacy has expanded from a narrow one to one that encompasses a wide range of other essential subjects. This transformation is produced by a number of variables, including expanded meaning due to its increasing general use, the advancement of information and communication technology, and changes in analogies (Arianto et al., 2024; Valentina et al., 2023).

The International Literacy Association explains that literacy is the ability to recognize, understand, interpret, create, compute, and communicate using visual, auditory, and digital symbols on cross-disciplinary and scientific topics (Meliyanti & Aryanto, 2022). Furthermore, in the national assessment, literacy is said to be the ability of students to understand, use, evaluate, reflect on various types of texts to solve problems and develop individual capacity as Indonesian citizens and world citizens so that they can contribute productively to society (Purwanto, 2021; Naibaho, et al., 2022).

Literacy is the ability to be aware of letters which include four language skills, not only that, literacy is also closely related to all efforts to obtain information, knowledge and aspects of computers, the internet, and digital (Lestari, et al., 2022). Even literacy is also part of solving problems as explained by the National Institute for Literacy that literacy is an individual's ability to read, write, speak, calculate, and solve problems at the level of expertise required in family,

work, and society (Panglipur & Yana, 2023, Hoerudin, 2023). Based on this, it can be said that literacy is not only related to reading but is broader than that, literacy also includes efforts to obtain information by utilizing various sources starting from various sources of information that are common, including those that are currently digital (Asraf, 2021; Lestari, et al., 2022).

Since literacy is a fundamental skill that every person needs to have in order to live their life in the future, it is necessary to pay attention to literacy development. Parents' experiences must be used to support the development of their children's reading abilities. An essential component of the reading process is experience. As a result, parental literacy is crucial for preparing children for the educational system (Timbowo et al., 2022; Putri et al., 2023).

Indonesia is one of the countries in Southeast Asia whose people are mostly low in literacy. This fact is shown by the latest Programme for International Student Assessment (PISA) score in 2022, where Indonesia was ranked 69th out of 80 countries that took part in the 2022 PISA assessment. PISA is implemented by the Organization for Economic Cooperation and Development (OECD) which tests reading, mathematics, and science literacy skills. Indonesia's score is below the international average as shown in the following figure (OECD, 2023; Avvisati, et al., 2019; Maskar, et al., 2022).

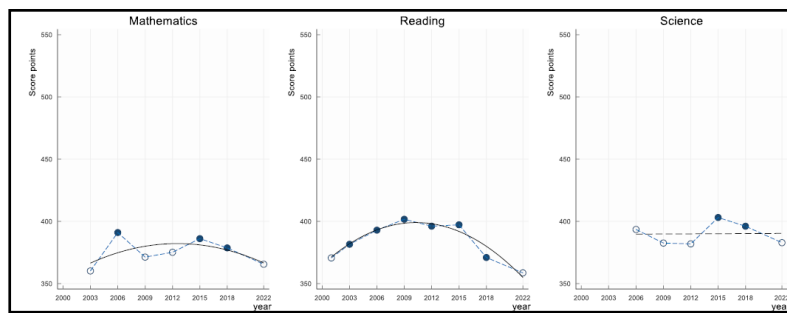


Figure 1. PISA Assessment Results 2022 (source: OECD, PISA 2022, <https://oecdch.art/a40de1dbaf/C108>)

Through a simple analysis, it can be seen in Figure 1 that the reading and mathematics literacy score curves are relatively similar compared to the science curve which shows a relatively constant value. This raises the assumption that there is a relationship between reading and mathematics literacy. Literacy is

closely related to the demands of reading skills. Literacy includes how a person is able to understand information analytically, critically and reflectively including encouraging the ability to identify, determine, find, evaluate and create effectively and organized including communication skills (Zahroh, et al., 2020; Nursyifa & Marsyitoh, 2023).

Several studies have shown that more and more high-standard mathematics tests around the world emphasize the use of mathematical story problems to assess students' mathematical abilities. This assessment not only requires students to think mathematically, but understanding mathematical story problems in this test also involves students' language skills, reading comprehension, and working memory. This shows that students' reading comprehension ability of problem sentences, especially story problems or problem-solving problems, tends to affect their mathematical abilities (Pongsadil, et al., 2023; Öztürk, et al., 2019; Trakulphadetkrai, et al., 2017).

Mathematical problem solving is one of the competencies and skills that must be possessed and developed by students. One of the efforts to train students' abilities in mathematical solving is using Polya's theory with the first stage of understanding the problem, second making a plan, third implementing the plan, fourth checking again. Solving a problem is not only by reading, but also by understanding the contents of the problem. Students here are objects who must master various concepts in mathematics (Polya, 2004; Sagita, et al., 2023).

B. METHOD

This study uses a descriptive analysis research method with 39 fifth grade elementary school students at Bandung State Elementary School as research subjects with 6 students selected as interview subjects. The selection of six students as research subjects was not only based on the results of problem-solving tests, but also on the advice of teachers who have known and understood the students' abilities and taught mathematics in class and also based on students' daily grades in class.

Several data collection procedures used in this study, namely observation, test equipment, documentation, interviews, and triangulation. This research

procedure includes four stages, including: (1) preparation and observation process (data collection); (2) processing of observation data; (3) data analysis (data reduction and inventory); and (4) concluding observation results (Cresswell, 2015).

Data analysis is based on the Theory of Miles and Huberman (Cresswell, 2015) with stages, including: (1) Data collection and codification; (2) Inventory of research data results; (3) Data grouping; (4) Data Interpretation.

C. RESULT AND DISCUSSION

This study is a reflective and strategic effort in interpreting reading literacy as one of the most important indicators in improving students' mathematical problem-solving abilities, especially elementary school students. By knowing the extent of students' reading literacy, teachers as the first people in schools who will accompany and assist students in developing their mathematical problem-solving abilities can prepare learning tools that will later be able to support these abilities. Mathematical problem-solving abilities in this study use four POLYA stages, namely understanding the problem, devising a plan, carrying out the plan, and looking back. In the first stage, namely understanding the problem that will be discussed in this paper.

There were several student errors in answering the questions found by the researcher, and after further observation and interviews, the researcher found errors in the interpretation of the question sentence by the students. It was mentioned that students with the initials A, B, C, D, E, and F. Where B understood that in question 1, the weight of a watermelon is $\frac{1}{2}$ kg heavier than a melon, if the melon is $3\frac{1}{2}$ kg, then the weight of the watermelon is $3\frac{1}{2} + \frac{1}{2} = 4$ kg. So the total weight of the fruit that the mother bought is the weight of the melon plus the weight of the watermelon to $7\frac{1}{2}$ kg. Even B changed the mixed fraction $7\frac{1}{2}$ into a decimal fraction, namely 7.5. The confirmation result, B knows that the value of $\frac{1}{2} = 0.5$, so B wrote the final result as 7.5 kg. This is shown in the picture below.

$3\frac{1}{2}$ kg dan satu buah semangka $\frac{1}{2}$ kg lebih
dibeli ibu seluruhnya?
 $3\frac{1}{2} + 4 = 7\frac{1}{2} = 7,5 = 7,5$

Figure 2. Answer B for Question 1

C is also able to understand the sentence in question 1, which states that the weight of a watermelon is $\frac{1}{2}$ kg heavier than a melon, and not stating that the weight of a watermelon is only $\frac{1}{2}$ kg. C answers question 1 with the result $7\frac{1}{2}$ kg. However, C makes a wrong mathematical model for solving question PM 3. C writes a mathematical sentence to solve question 1 with $3\frac{1}{2} = 7/2 + 1/2 = 8/2 = 7\frac{1}{2}$ kg. C explains that the purpose of the mathematical sentence made is to state that the weight of a watermelon is $3\frac{1}{2}$ kg plus $\frac{1}{2}$ kg so that the total becomes 4 kg, so the total weight of the watermelon and melon is 4 kg plus $3\frac{1}{2}$ kg to become $7\frac{1}{2}$ kg. The excerpt from the interview with C for this explanation is as follows:

- Researcher* : C, can you explain the calculation process that you did on this question sheet to get the answer?
- C* : This ma'am means $3\frac{1}{2}$ plus $\frac{1}{2}$, so it becomes 4, then I wrote it on the watermelon to indicate that the weight of the watermelon is 4 kg. Then I added the weight of the melon $3\frac{1}{2}$ kg, so the total weight of the fruit is $7\frac{1}{2}$ kg.
- Researcher* : Okay, thank you. According to A3, is the writing $3\frac{1}{2} = 7/2 + 1/2 = 8/2 = 7\frac{1}{2}$ correct?
- C* : I don't know ma'am, maybe it's correct.

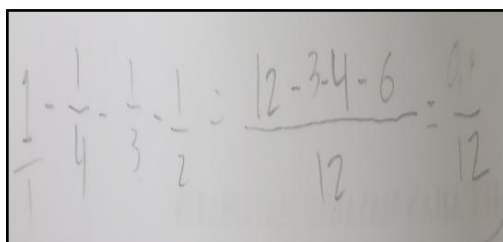
According to C's explanation above, C is aware of the problem sentence but is still unable to fully comprehend the procedural idea involved in problem solutions. Despite the fact that A, D, E, and F gave erroneous answers, the pupils' poor comprehension of the problem sentence "one watermelon $\frac{1}{2}$ kg is heavier than a melon" was confirmed. Since the pupils were obsessed and believed the watermelon weighed only half a kilogram, they promptly added it to the melon's weight of three and a half kilograms, making the total weight of the fruit four kilograms. This is seen in how the following pupils solved the problem they worked on.

A uses the formula $3 \frac{1}{2} + \frac{1}{2} = 3 (1 + 1) / 2 = 3 \frac{2}{2} = 4$ kg to perform the calculation. Because A considers that 3 in $3 \frac{1}{2}$ is a stand-alone integer in this calculation process, it is not necessary to temporarily account for it when working on the arithmetic operation $3 \frac{1}{2} + \frac{1}{2}$; instead, $\frac{1}{2} + \frac{1}{2}$ can be operated with the form $(1 + 1) / 2 = 2/2$. The final result is 4 kg once this form is computed using the number 3 as an integer, specifically $3 \times 2/2 = 4$.

D first converts the mixed number $3 \frac{1}{2}$ into a common fraction $7/2$, which is then added to $1/2$ to yield the final value 4, completing the arithmetic process. The formula for this is $7/2 + 1/2 = 8/2 = 4$. The computations that D does are identical to those that E and F perform.

Only three of the six subjects—A, B, and C—answered question two properly. pupils truly grasped the purpose of the difficulty posed in question 2 since these three pupils were able to comprehend the text. The findings of the three students' confirmation indicated that they understood that the portion of the pudding that was taken was initially from the entire pudding, that the father took a quarter ($1/4$) of the portion that was still whole, that Ahda and Halim took the remaining portion again, and that the mother consumed the remaining portion, even though the amount taken by Ahda

The researcher asked A, B, and C to explain their answers by representing their answers in writing or pictures. The three students tried to describe according to their respective understanding and knowledge, and the results given were quite capable of describing the problem given in question 2, although the picture was different from the three students A, B, and C. The following is a picture of the solution to question 2 from confirmation to the three students.



The image shows a handwritten mathematical equation on a piece of paper. The equation is: $1 - \frac{1}{4} - \frac{1}{3} - \frac{1}{2} = \frac{12-3-4-6}{12} = \frac{0}{12}$. The numbers 12, 3, 4, and 6 are written in the numerator, and 12 is written in the denominator. The final result is 0/12.

Figure 3. Answer A for Question 2

Assuming that it starts with something complete as a single unit, A resolves problem 2. A writes $1 - \frac{1}{4} - \frac{1}{3} - \frac{1}{2} = \frac{(12-3-4-6)}{12} = \frac{0}{12}$ as his mathematical

phrase. A is quite confused by this as, although the true outcome of the arithmetic operation should be $(-1)/12$ rather than $0/12$, A still believes that the pudding is done or that the ultimate result is zero (0). To address his confusion over the computations that A performed, A also simulates by explaining the portions taken by Father, Ahda, Halim, and Mother. In order to comprehend the question sentence once more, A explains the components while reading the question again; these components are shown in figure 3 above.

B, like A, attempts to describe the answer to question 2, as shown in figure 4 below. B pours forth the picture of his answer with an illustration of a picture rather than a mathematical sentence in the form of an arithmetic operation, since he believes it is easier to grasp and apply a visual.

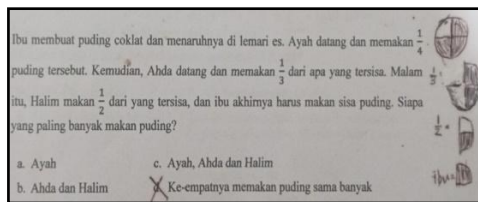


Figure 4. Answer B for Question 2

B explains that the circle is likened to a pudding that is still intact, then the father takes $1/4$ of the pudding that is still intact, so the pudding that the father takes is part of the pudding that has been divided into 4 parts. Then, Ahda takes $1/3$ of the remaining pudding, so from the picture it will appear that Ahda actually only takes $1/4$ of the remaining $3/4$ that Father took at the beginning. Halim eats $1/2$ of the rest that Ahda has taken, from the picture it will appear that Halim actually only takes $1/4$ of the remaining $2/4$ that Ahda has taken. So the remaining pudding after Halim took it was only $1/4$ of the part which was then eaten by Mother. From this picture illustration it can be concluded that actually Father, Ahda, Halim, and Mother each only took $1/4$ of the pudding.

The same thing was explained by C in the picture made as an answer to question 2. C only made one picture divided into 4 parts, where each part explains the taking of parts by Father, Ahda, Halim, and Mother. Where based on the picture shows that each gets the same part.

Meanwhile, D, E, and F answered incorrectly, where D and E had the same answer, namely Ahda and Halim who ate the most pudding. The results of

confirmation to D and E stated almost the same reason, namely they focused on the numbers $\frac{1}{3}$ and $\frac{1}{2}$. D and E assumed that the numbers $\frac{1}{3}$ and $\frac{1}{2}$ had a large value. The big point for D and E was that if a pudding was divided into two parts, then it would be $\frac{1}{2}$ part that someone would get, and $\frac{1}{3}$ was the part of the pudding divided into three parts. This was different from F who chose the answer of Father who ate the most pudding. This was because F was fixated on the number 4 which was the denominator in the fraction $\frac{1}{4}$. According to F, $\frac{1}{4}$ has the largest part of the fractions $\frac{1}{3}$ and $\frac{1}{2}$, because the number 4 is greater in value than the numbers 3 and 2.

Based on the results of the study above, it shows that when students do not understand the problem sentence correctly, it will be difficult to answer correctly and precisely what is asked in the question. This shows that reading literacy is important in solving students' mathematical problems. However, this literacy ability is also influenced by a person's intelligence. As in this study, research subjects A and B are students with high ability categories, C and D are students with medium ability categories, and E and F are students with low ability categories. In essence, someone with linguistic intelligence can listen well, speak or express ideas effectively, interpret readings well, and write skillfully. However, not many people have all of these abilities, so linguistic intelligence has various levels (Nurfaizi, 2021; Maskar, et al., 2022).

Meanwhile, in mathematical intelligence, a person is said to be mathematically intelligent if he has the ability to calculate and reason systematically, and can involve mathematical concepts in recognizing, identifying, and finding solutions to complex problems. Simply put, mathematical intelligence is the ability to operate arithmetic operations correctly and precisely (Ardiansyah, 2020; Maskar, et al., 2022; Sari, et al., 2022).

The results of the research and discussion above can be concluded that reading literacy can support students' mathematical problem-solving abilities. The next stage requires support from teachers in preparing learning tools for the implementation of learning that can help students develop and improve their mathematical problem-solving abilities.

D. CONCLUSION

Students with strong category abilities can solve problem-solving challenges, but they must be cautious and have a thorough comprehension of the problems they are working on. Meanwhile, children with medium and low category abilities are unable to tackle issue-solving difficulties on a large scale due to a lack of problem interpretation skills or reading literacy. Based on this, it is clear that reading literacy influences pupils' mathematics problem-solving skills. Furthermore, students' intelligence and precision, as well as instructor help, contribute to their performance in completing mathematical problems. It is believed that this research can be developed in the field of planning and implementing educational materials in order to increase students' reading literacy and mathematical

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