ELEMENTARY *Islamic Teacher Journal*
E-ISSN : 2503-0256 / ISSN : 2355-0155
Volume 10 Number 1 January - June 2022 (PP. 121-140)
http://dx.doi.org/10.21043/elementary.v10i1.14006
Diakses di : http://journal.iainkudus.ac.id/index.php/elementary

Why Did Elementary Students Have Difficulty Working in Mathematical Literacy Questions?

Zaenal Abidin

Universitas Pendidikan Indonesia
zaenal_abidin21@upi.edu

Tatang Herman

Universitas Pendidikan Indonesia
tatangherman@upi.edu

Laely Farokhah

Universitas Pendidikan Indonesia, Universitas Muhammadiyah Jakarta
laely.farokhah@umj.ac.id

Riduan Febriandi

Universitas Pendidikan Indonesia, Univeritsitas PGRI Lubuk Linggau
riduanfebriandi9@gmail.com

Amadhila Elina Penehafo

University of Namibia
elinaamadhila@gmail.com

Abstract

This study aimed to analyze students' learning difficulties in working on mathematical literacy questions. This research is qualitative research by taking data using tests, interviews, and observations. The results about the difficulty working in math literacy based on mathematical disposition have shown indicated that five factors cause students to find it hard to work on mathematical literacy questions. First, students have not understood the language, phrases, words, sentences, and the context of the story. Second, students were unable to make mathematical models or problem representations. Third, students did not understand mathematical concepts. Forth, students had wrong in performing mathematical procedures. Fifth, students were weak fighting power. From all these factors, students have a negative disposition toward mathematics which causes students to be unable or unwilling to solve mathematical literacy problems. The implication of the study shows that what must be improved is the negative mathematical disposition of students to be positive.

Keywords: Mathematical Literacy, Mathematical Disposition, Elementary Student

Abstrak

Penelitian ini bertujuan untuk menganalisis kesulitan belajar siswa dalam mengerjakan *soal literasi matematika. Metode penelitian yang digunakan yaitu desain kualitatif dengan pengambilan data menggunakan tes, wawancara, dan observasi. Hasil penelitian menunjukkan bahwa lima faktor menyebabkan siswa sulit mengerjakan soal literasi matematika. Pertama, siswa belum memahami bahasa, frasa, kata, kalimat, dan konteks cerita. Kedua, siswa tidak bisa membuat model matematika atau representasi masalah. Ketiga, siswa belum memahami konsep matematika. Keempat, siswa salah dalam melakukan prosedur matematika. Kelima, daya juang siswa lemah. Dari semua faktor tersebut, siswa memiliki disposisi negatif terhadap matematika yang menyebabkan siswa tidak mampu atau tidak mau menyelesaikan masalah literasi matematika. Jadi implikasi penelitian ini menunjukkan bahwa yang harus diperbaiki adalah disposisi matematis negatif siswa menjadi positif, dengan meningkatkan kualitas proses pembelajaran matematika di sekolah dasar. siswa telah salah dalam melakukan prosedur matematika. Kelima, daya juang siswa lemah. Dari semua faktor tersebut, siswa memiliki disposisi negatif terhadap matematika yang menyebabkan siswa tidak mampu atau tidak mau menyelesaikan masalah literasi matematika. Jadi implikasi penelitian ini menunjukkan bahwa yang harus diperbaiki adalah disposisi matematis negatif siswa menjadi positif, dengan meningkatkan kualitas proses pembelajaran matematika di sekolah dasar. siswa telah salah dalam melakukan prosedur matematika. Kelima, daya juang siswa lemah. Dari semua faktor tersebut, siswa memiliki disposisi negatif terhadap matematika yang menyebabkan siswa tidak mampu atau tidak mau menyelesaikan masalah literasi matematika. Jadi implikasi penelitian ini menunjukkan bahwa yang harus diperbaiki adalah disposisi matematis negatif siswa menjadi positif.*

Kata Kunci: *Literasi Matematika, Disposisi Matematika, Siswa Sekolah Dasar*

INTRODUCTION

In general, the current low quality of Indonesian human resources can be explained as a result of poor education, particularly in mathematics. This is also evident from a variety of metrics. At the national level, the minimum competency assessment (AKM) standard is used to evaluate mathematics learning in schools. Meanwhile, at the international level, two major tests, TIMSS (Trend in International Mathematics and Science Study) and PISA (Program for International Student Assessment), are being used to assess students' mathematical abilities.

In terms of mathematical aptitude, Indonesia was ranked 36th out of 40 nations in a 2011 survey of the results of TIMSS, which has been conducted every four years since 1999. The results from 2015 demonstrate that Indonesian pupils did not attain sufficient outcomes. With an achievement score of 397, Indonesian students are ranked 45th out of 50 countries, well below the international average of 500 (Fishbein *et al.,* 2021).

The 2015 PISA study report confirms the inadequate quality of education. Out of 70 countries, Indonesia ranks 62nd in Science, 63rd in Mathematics, and 64th in Reading (OECD, 2016). Science and Mathematics are ranked 64th out of 65 nations on PISA, while Reading is ranked 61st out of 65 countries. Science 403 (382), Mathematics 386 (375), and Reading 397 were the average PISA 2015 (and 2012) scores (396).

It is crucial to have a strong grasp of mathematics. This is because mathematical literacy focuses on pupils' capacity to properly understand, reason, and articulate ideas about fractions of mathematical issues (OECD, 2016). This is what relates classroom mathematics to a range of real-world scenarios. The OECD defines mathematical literacy as an individual's ability to formulate, apply, and comprehend mathematics in various circumstances (Khaerunisak *et al.,* 2017). This includes applying mathematical concepts, techniques, data, and instruments to describe, explain, and predict phenomena and events.

The International Association for the Evaluation of Educational Achievement (IAE) in Amsterdam conducts the TIMSS survey, which focuses on the mathematical and cognitive content of students. Numbers, Algebra, Geometry, Data, and Probability are among the content domains, whereas knowledge, application, and reasoning are among the cognitive domains. Meanwhile, the Organization for Economic Cooperation and Development (OECD), a United Nations organization based in Paris, organizes the three (3) annual PISA research to measure pupils' mathematical literacy. The ability of pupils to identify, grasp, and apply the fundamentals of mathematics is the subject of PISA investigations.

The quality of students' mathematical reasoning and their ability to apply it in everyday life is the focus of the TIMSS and PISA studies. This demonstrates students' difficulty in relating formal mathematical principles to real-world concerns (Chasanah *et al.,* 2020). Taking into account the low capacity of Indonesian students in the survey, the Indonesian government, specifically the Ministry of Education and Culture, has made many curricular revisions to prepare for this.

From 2000 to the present, three different types of curricula have been implemented: the 2004 curriculum, the 2006 curriculum, and the 2013 curriculum. Temporary observations reveal that, despite changes in the curriculum, the teacher's function and role in teaching mathematics, particularly in terms of how to communicate subject information, has remained constant.

Students' mathematical abilities are valued not only for their ability to count, but also for their ability to reason rationally and critically while solving problems. Solving this problem entails not only answering routine queries, but also dealing with situations that arise daily. Mathematic literacy is a term used to describe this type of mathematical skill. Someone who is mathematically literate not only understands the subject, but can also apply it to everyday concerns. Literacy is derived from Latin (letters) and refers to the mastery of writing systems and the conventions that go with it. Literacy, on the other hand, is primarily concerned with language and how it is utilized, with the written language system coming in second. Because the development and use of language are inextricably linked to culture, the term literacy must encompass components that surround the language itself, such as the socio-cultural context (Siswono *et al.,* 2019).

According to the 2012 PISA report, another definition of mathematical literacy is an individual's capacity to formulate, apply, and interpret mathematics in multiple circumstances. This ability comprises mathematical thinking as well as the ability to describe, explain, and forecast a phenomenon using mathematical concepts, methods, facts, and mathematical functions (OECD, 2016). Each individual will be able to reflect on mathematical reasoning to play a part in his life, community, and society once they have mastered mathematical literacy. Mathematically literate individuals are able to make decisions based on a constructive mathematical attitude

According to Machaba (2018), literacy has four levels: performative, functional, informational, and epistemic. People can read, write, listen, and communicate with the symbols utilized at the performative level. People can utilize language to suit the necessities of daily living, such as reading newspapers, manuals, or instructions, at the functional level. People can access knowledge with language abilities at the informational level, and people can convey knowledge in the target language at the epistemic level.

Student literacy can be influenced by a variety of factors. In general, these elements can be divided into two categories: factors that affect students directly (internal) and factors that affect students indirectly (external). Internal elements are separated into two categories: cognitive (intellectual, numerical, and verbal abilities) and non-cognitive (interest and motivation). The home, school, mass media, and social environments are all examples of external variables (Suharta & Suarjana, 2018).

Students that have a mathematical propensity have a favorable attitude toward mathematics because they consider it to be reasonable, practical, significant, and worthwhile. Additionally, students are persistent and self-assured when learning and using mathematics. (Almerino Jr. *et al.,*, 2019). Indicators of a mathematical disposition, according to Wilkerson (2021), include: (1) curiosity; (2) attentiveness and interest in learning; and (3) a tenacious and self-assured approach to problem-solving. Kusmaryono, *et al.,* (2019) state that the following traits are indicative of a productive disposition: (1) enthusiasm; (2) refusal to give up easily; (3) assurance; (4) high level of inquiry; and (5) willingness to share. Tenaciousness and confidence in problem-solving skills were employed as markers to assess students' productive dispositions in this study. This is demonstrated when children respond in their ~~own~~ unique manner and then by the work process they engage in, whether or not it is directed.

The objective of this study was to examine how students' mathematical dispositions affected the kind of challenges they encountered when trying to solve mathematical literacy questions. This study is innovative since it is the first to examine students' challenges in terms of their attitudes toward mathematics.

METHODS

Design and Participant

This study employs a qualitative methodology. Interviews and exams were used to collect data for this investigation (Creswell, 2017).The participants in this study were 24 children from Bandung's 4th-grade elementary school. The purpose of selecting the topic is to gather as much information as possible from a variety of sources. Five students were chosen for additional interviews out of a total of 24**.** The 24 students were separated into three groups depending on their past knowledge (prior knowledge) for this study. The purpose is to assess pupils' conceptual comprehension and problem-solving abilities. The following groupings were determined based on document analysis and conversations with class teachers in grade 5 at one of Bandung's schools.

Table 1. Demographic Participants

Selection by		F
Gender	Male	10
	Female	14
Prior Knowledge	Upper	5
	Intermediate	14
	Lower	5

Data Collection Tools

A mathematics problem-related test device. In this study, the test instrument was utilized to answer the following indicators about literacy mathematics based on mathematical disposition (Rizki & Priatna, 2019):

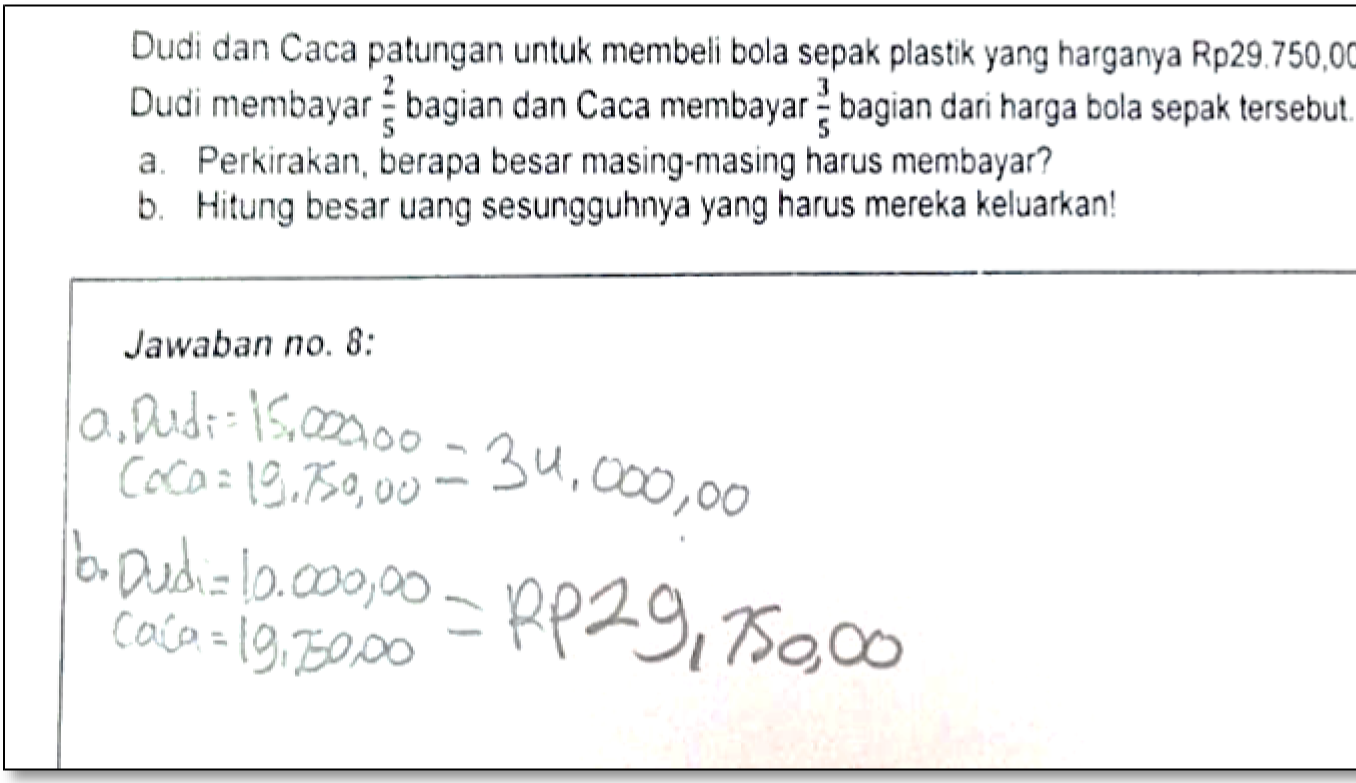
a. Knowing what information is needed and what is not needed
b. Make a picture or representation of a problem
c. Guessing a problem
d. Organizing a problem with relevant prior knowledge
e. Evaluating the information of the problem

Data Analysis

Interviews and written testing results were evaluated. The researcher listened to the first tape while considering the correlation between student outcomes and associated literature. The researcher listened intently to the findings of the interview and the student's written test during the second recording to determine each attribute of difficulty dealing with Mathematical Literacy Questions. The determination of these features is a crucial stage in data analysis since it makes it easier to comprehend useful data. A literature review, identifying each interview answer, and students' written assessments that represent relevant concepts in the literature reveal these features.

RESULTS AND DISCUSSION

1st Difficulty. *Do not understand language: words, phrases, sentences, story context*


Dudi dan Caca patungan untuk membeli bola sepak plastik yang harganya Rp29.750,00
Dudi membayar $\frac{2}{5}$ bagian dan Caca membayar $\frac{3}{5}$ bagian dari harga bola sepak tersebut.
a. Perkirakan, berapa besar masing-masing harus membayar?
b. Hitung besar uang sesungguhnya yang harus mereka keluarkan!

Jawaban no. 8:
a. Dudi = 15.000,00
Caca = 19.750,00 = 34.000,00
b. Dudi = 10.000,00
Caca = 19.750,00 = RP29.750,00

Figure 1. Student answer: Do not understand language: words, phrases, sentences, story context

In Figure 1, we can see the problems that occur, namely that children cannot predict or guess well. In part a, the children should be able to guess well, because the question does not require such complex numbers. However, this is inversely proportional to the results of the trials that have been carried out, only 6 people can answer the question well, namely 4 people from the high group and 2 people from the low group. This shows that there are still high group of children who are not good at conjecturing. In addition, in part b, children are required to have good reasoning skills, With these demands, it can be assumed that there are still highly capable children who have poor mathematical reasoning abilities. This is the focus of the interview by the researcher, the following is the interview:

> *G: "How is it easy, isn't it?"*
>
> *S10: "Not bad, is it easy to get difficult?"*
>
> *G: "What about number 8?"*
>
> *S10: "Well, if it's difficult. Too bad you have to guess. Why don't you just get the answer right away? Don't guess."*

From the conversation, it turns out that children with high abilities may not be able to guess. But the child does not have the motivation and interest in the problem. This could be due to the selection of diction that is less precise and less contextual for children. This is because students do not understand mathematics, that mathematics is not just counting numbers or only procedural, but it is also related to real life.

2nd Difficulty. *Unable to make a mathematical model: make a representation of the problem*

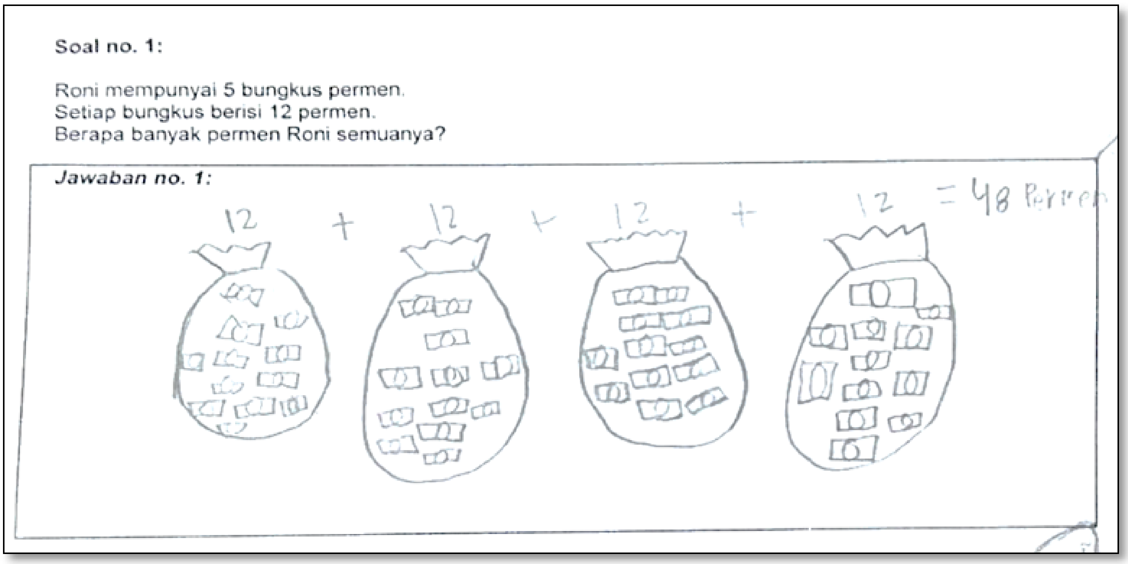


Figure 2. Student answer: Unable to make a mathematical model: make a representation of the problem

In question number 1, as many as 19 people out of 24 people could answer the question correctly. However, 5 people answered incorrectly, namely 2 people from the medium group and 3 people from the low group. This is because students are not careful in reading the questions, so it is suspected that these 5 students have poor reading comprehension skills. In addition, they are capable of representation, this can be seen in Figure 1. The picture explains that in general children have begun to be able to represent written sentences in a mathematical context even with pictures, but he only drew 4 bags which should have been 5 bags. Then, the child who answered the question was asked for further confirmation of the answer. The interview script is as follows:

G: "Why draw only four pockets?"

S4: "How much should it be?"

G: "Let's see the problem again"

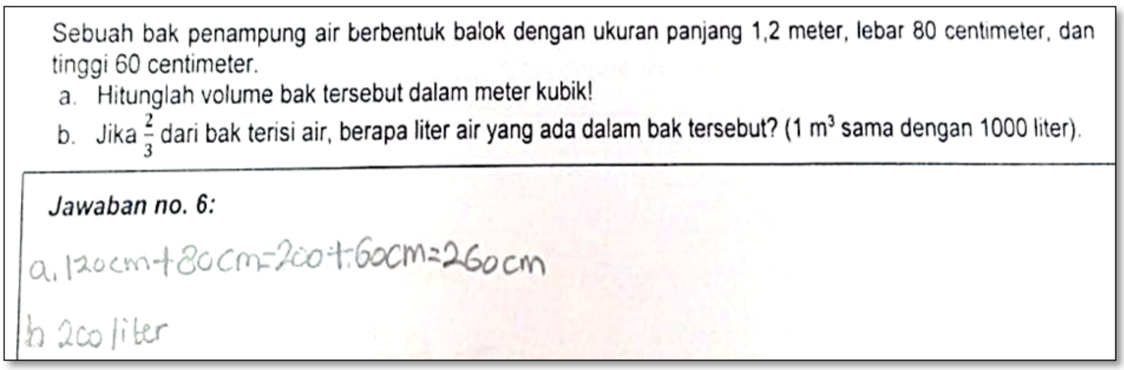
S4: read the question again then answer "oh, it should be five. Why did I answer that I only drew 4 bags?"

G: "You didn't double-check, did you?"

S4: "No, hehe".

From the interview, it can be concluded that the child understands the concept of knowledge. Children can also represent mathematics. However, the child does not have the desire to double-check the answers that have been given. So this has an impact on the accuracy of the child.

3rd Difficulty. *Mistakes in doing mathematical* procedures


Sebuah bak penampung air berbentuk balok dengan ukuran panjang 1,2 meter, lebar 80 centimeter, dan tinggi 60 centimeter.

a. Hitunglah volume bak tersebut dalam meter kubik!

b. Jika $\frac{2}{3}$ dari bak terisi air, berapa liter air yang ada dalam bak tersebut? (1 m^3 sama dengan 1000 liter).

Jawaban no. 6:

a. 120cm+80cm=200+60cm=260cm

b 200 liter

Figure 3. Student Answer: Mistakes in doing mathematical procedures

Figure 3 explains that students still have difficulty in understanding the structure of language and converting it into mathematical sentences, this is because children's comprehensive reading ability is still very low. Difficulty understanding the problem, in terms of reading ability and mathematical sentences. This is presumably because students experience ambiguity, namely the interpretation of a form of student visualization of the problems they receive. Reading barriers are also one of the causes of this difficulty occurring in students with low mathematical abilities. Reading barriers are closely related to the development of individual thinking, namely the development of language, which lies in the ability to understand, build opinions and draw conclusions.

This statement is evident from the test results, only 2 out of 24 students can answer this question correctly, only 8%. This shows the very poor reading comprehension ability of children, further related to children's literacy skills. The results of interviews with each student from each group (low, medium, and high) related to this problem are as follows:

G: "Why can't you do this problem?"

S14: "Lieur ah pa" (Feeling stress in Sundanese)

G: "Why can't you answer?"

S17: "Same pa dizzy. The count has to be back and forth. So lazy to do it. "

S 24: "Yes sir, the language is back and forth, not clear, so we are dizzy. Then the teacher has never taught anything like this."

From the conversation, it is clear that the language/editorial factor is the main problem. The interesting thing is that there are students' answers in the high group who explain that they find it difficult because they feel they have not mastered the concept and have not been taught how to work by the teacher. This is the clarity of the problem that students do not have good heuristic strategy skills in answering problem-solving problems. This is thought to be the cause because students cannot draw on the knowledge they have, so students cannot build new understandings. Another cause is that students are confused in knowing the relationship between two problems, namely problems that have been solved and problems that they have just discovered.

4th Difficulty. *Don't understand/understand math*

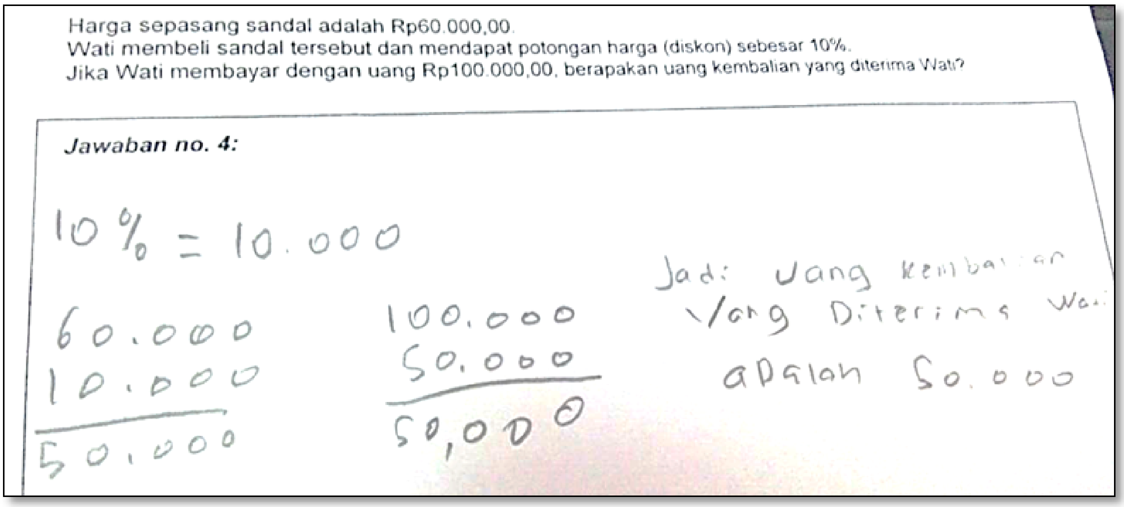


Figure 4. Student Answer: *Don't understand/understand math*

~~In~~ Figure 4 above, it is very visible the weakness of students in understanding reading. The answers given do not match the context of the questions given. In addition, children's reasoning abilities are still very lacking. This can be proven by the test results which show only 6 people who can answer the question. But the problem is, that 50% of children with high abilities cannot answer the question correctly. When confirmed the following is the answer from his son:

G: "why did you answer the wrong number 4?"

S19: "time?" feeling right ah".

G: "Take a look at your answer!"

S19: look at the questions. "Oh yes, I was wrong. How come? Even though I can do it."

In contrast to the answers of students from the high group, students from the medium group who did not answer this question (emptied the answer sheet) when asked about the question in question, ~~their~~ responses were as follows:

G: "why don't you answer question number 4?"

S8: " I'm dizzy, how should I answer? "

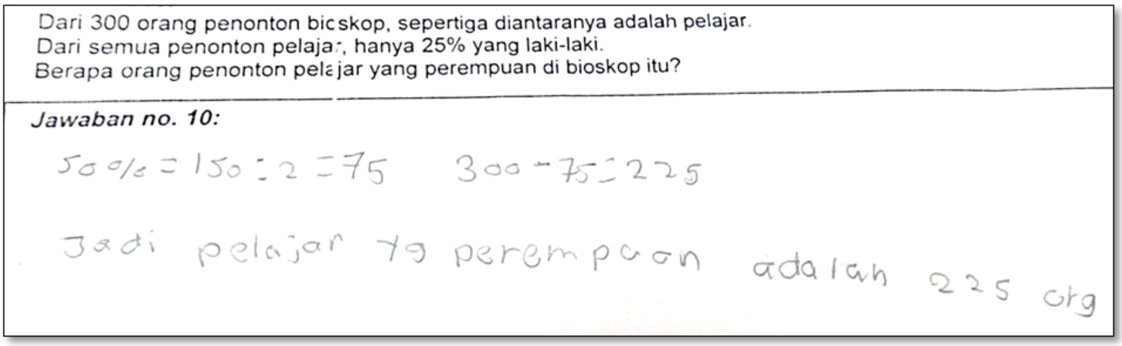
G: "You don't want to try?"

S8: "It's okay, I'm very dizzy. I don't know what the percentage is, how to calculate the discount?"

That's the response of students from the middle group. This could be because the child has not mastered the concept well or it could be that the child has an arithmetic disability. Because of the 10 questions given, he only answered 1 question, namely question number 1.

Children with numeracy disorders may have difficulty remembering facts quickly and accurately, counting objects correctly and quickly, or sorting numbers in columns. involves the use of strategies that are not following the stage of development in solving arithmetic problems and often making mistakes in solving simple problems.

Difficulty 5. *Weak fighting power*


Dari 300 orang penonton bioskop, sepertiga diantaranya adalah pelajar.
Dari semua penonton pelajar, hanya 25% yang laki-laki.
Berapa orang penonton pelajar yang perempuan di bioskop itu?

Jawaban no. 10:

50% = 150 : 2 = 75   300 - 75 = 225

Jadi pelajar yg perempuan adalah 225 org

Figure 5. Student answer: Weak Fighting Power

In the case of number 10, an oddity occurred because seen from the results 11 children could answer this number correctly. This question is a medium-type question and is more difficult than some other number questions. This turned out to be caused because the teacher helped explain to students to answer the question. So that the children can solve problem number 10 well.

But in general, there are still 13 children who have not been able to do this problem well, this is because students have not been able to read comprehensively and put it in a good mathematical representation.

The questions given were analyzed based on the students' initial mathematical abilities, and the following conclusions were obtained. First, difficulties for students with low mathematical abilities are understanding problems in terms of the ability to read and understand the meaning of mathematical symbols or sentences, understanding the concept of multiplying fractions by integers, representing problems in the form of pictures or mathematics, developing strategies in solving problems, and building mathematical reasoning.

The second, the difficulties of moderate ability students are representing problems in the form of pictures and mathematics, understanding problems, building mathematical reasoning, developing strategies for solving problems, and understanding fraction concepts. And third, the difficulties of high-ability students are understanding problems, representing problems in the form of pictures, building strategies in solving problems, and mathematical reasoning.

The cause of the emergence of difficulties in solving a problem is due to several things as follows. First, difficulty understanding the problem, in terms of reading ability and mathematical sentences. This is presumably because students experience ambiguity, namely the interpretation of a form of student visualization of the problems they receive. Reading barriers are also one of the causes of this difficulty occurring in students with low mathematical abilities. Reading barriers are closely related to the development of individual thinking, namely the development of language, which lies in the ability to understand, build opinions and draw conclusions. Another cause of this difficulty is that students do not review or re-assure their understanding of the given problem or not. This happens to students with high abilities. Some high-ability students do not apply to look back, because they feel satisfied with the answers they get without checking them again. Furthermore, another cause is that students experience reactive disorders, namely disturbances that occur when new subject matter brings conflict and interferes with the recall process of knowledge of old learning materials. In this case, the old subject matter will be difficult to remember or reproduce. (Retnawati *et al.,* 2017; Setiawati *et al.,* 2017)

Second, Represent problems both in the form of pictures and mathematics. This is because students do not understand the concept, it is suspected that there is a disturbance in the stages of the memory process in students starting from the first time understanding the concept is given, then how to hold the information or concept and withdraw the information when getting a problem related to the concept. This is also because the information or concept is transferred only as short-term memory, good learning should be learning that can lead children to learn meaningfully so that information or concepts will be stored in long-term memory. (Kusumaningsih *et al.,* 2019; Sari *et al.,* 2018)

Third, build a strategy (heuristic) for solving a problem. This is thought to be the cause because students cannot draw on the knowledge they have, so students cannot build new understandings. Another cause is that students are confused in knowing the relationship between two problems, namely problems that have been solved and problems that they have just discovered. Students are adrift with one problem-solving solution given by the teacher, so students have difficulty in building strategies in solving problem-solving problems. (Tambunan, 2018)

Forth, Understand concepts related to problems, such as multiplication of fractions by integers, conversion of units of length, and other concepts. This is thought to be due to a memory disorder, namely "Arithmetic Disability" or "Dyscalculia" namely the inability of memory in calculations. The causative factor is that it can occur in the developmental process, which is thought to have something to do with a person's genetics to understand, remember or manipulate facts, numbers, operating symbols, abstract concepts, and comparisons. Memory impairment is also the cause of this difficulty, namely in the coding, storage, and retrieval of information. This also affects the missed stages in procedural mathematics. (Hwang & Ham, 2021; Tambunan, 2018). And fifth, build mathematical reasoning. This is because students do not understand mathematics, that mathematics is not just counting numbers or only procedural, but it is also related to real life. (Habsah, 2017; Tambunan, 2019)

If viewed from the mathematical disposition theory, this shows that students who can work on questions tend to have a positive disposition, and conversely, students who have difficulty working on questions have a negative disposition. Productive disposition can be interpreted as a positive perception of mathematics. Productive disposition is the habit of cultivating a positive attitude and the habit of seeing mathematics as something logical, useful, and useful (Yaniawati *et al.,* 2019). In other words, a productive disposition can be defined as a good attitude toward mathematics, since pupils see mathematics to be rational, practical, relevant, and significant. Students also have confidence and persistence when it comes to learning and working with mathematics (Ab, J. Sutrisno, 2020).

Wilkerson (2021) lists the following traits as characteristics of a productive disposition: (1) curiosity; (2) attention and interest in learning; and (3) a tenacious and confident approach to problem solving. Meanwhile, Almerino, Jr. *et al.,* (2019) list five characteristics for a productive disposition: (1) enthusiasm; (2) never giving up; (3) confidence; (4) strong curiosity; and (5) desire to contribute. The indicator used to determine the productive disposition of students in this study is having a tenacious attitude and being confident in solving problems. This can be seen when students provide answers in their way, then the work process is carried out by students, whether it has been directed or not.

This mathematical disposition is inextricably linked to conceptual understanding, strategic competency, procedural fluency, and strong mathematical adaptive reasoning (Gabriel *et al.,* 2018). According to Baumgartner *et al.,* (2021), a student with a good productive disposition is more likely to gain mathematical skills in terms of conceptual understanding, procedural fluency, strategic competence, and adaptive learning. Those who excel at conceptual comprehension, procedural fluency, strategic competence, and adaptive reasoning, on the other hand, are more likely to develop productive dispositions (Fery *et al.,* 2017).

One of the important skills in mathematics that students have is conceptual understanding. Good mastery of concepts can provide opportunities for students to be more flexible and interested in solving a given problem. This is also in line with the opinion of Lestari & Surya (2017) that conceptual understanding in mathematics is an important basis for solving problems.

Conceptual understanding is concerned with understanding mathematical concepts, their operations, and the relationships between concepts. Students who have a conceptual understanding will know more than the facts and formulas that exist. Students will understand why mathematical ideas are important and which contexts are useful in solving a problem (J. S. Ab *et al.,* 2019; J. Sutrisno Ab, 2020).

Clements & Sarama (2020) identified some indications of concept comprehension. in addition to: (1) the capacity to restate a concept; (2) the ability to classify items based on the idea's attributes; (3) the ability to give examples and not examples; (4) the ability to convey concepts in various forms of mathematical representation; (5) the ability to construct the necessary or sufficient requirements for the concept; (6) the ability to employ, utilize, and select particular processes; and (7) the ability to apply concepts/algorithms to problem-solving.

Knowledge of processes, when and how to utilize them effectively, and skills in showing them flexibly, accurately, and efficiently are all examples of procedural fluency (Kusumaningsih *et al.,* 2019; Suharta & Suarjana, 2018). Procedural fluency, or knowledge of procedures and how to employ diverse operations appropriately to solve problems, is referred to as procedural fluency.

Other parts of mathematical competence, such as conceptual understanding, require procedural fluency. Students' knowledge of excellent and accurate procedures, together with their comprehension of mathematical principles, will make it easier for them to connect the concepts and problems presented. Students will struggle to enhance their mathematical comprehension or solve problems if they lack adequate procedural competence(Hutajulu *et al.,* 2019; Retnawati *et al.,* 2017).

Strategic competence in mathematical skills is also known as student skills in problem-solving. Mathematical strategic competence is built from three components of ability, namely: formulating, representing, and solving problems (W. Lestari & Jailani, 2018; Sari *et al.,* 2018). These three components of ability are important activities to achieve competence in real life.

The ability to formulate has a very important role, especially in understanding the problem. This is because most of the problems that exist in the real world are problems that have not been in the form of a mathematical model, so there needs to be a skill to formulate them in mathematical form(Almerino, Jr. *et al.,* 2019). The next ability is the ability to represent. This ability can support students in understanding and recognizing mathematical concepts, so that they can present mathematical problems in various forms, such as tables, pictures, or diagrams. With this representation, the problem is more described and more concrete so that it seems easier to understand and solve (Setiani *et al.,* 2018).

The ability to think logically about concepts and conceptual relationships is known as adaptive reasoning. To arrive at a solution, the reasoning is required to traverse through many procedures, facts, and concepts. Many people's ideas about mathematical thinking are limited to formal proofs and other forms of deductive reasoning. Adaptive reasoning is a much larger concept that encompasses not only informal explanation and justification, but also pattern-based inductive reasoning (Hasanah *et al.,* 2019; Setiawati *et al.,* 2017).

Adaptive reasoning is a method for pupils to determine whether a problem solution is correct and logical. Adaptive reasoning, according to Tokada et al. (2017) is the ability to derive logical inferences, forecast solutions, provide explanations of the concepts and answer techniques used, and numerically evaluate their accuracy.

CONCLUSION

The results have shown indicated that five factors cause students to find it hard to work on mathematical literacy questions. First, students have not understood the language, phrases, words, sentences, and the context of the story. Second, students were unable to make mathematical models or problem representations. Third, students did not understand mathematical concepts. Forth, students had wrong in performing mathematical procedures. Fifth, students were weak fighting power. From all these factors, students have a negative disposition toward mathematics which causes students to be unable or unwilling to solve mathematical literacy problems.

Difficulties for students with low mathematical abilities are understanding problems in terms of the ability to read and understand the meaning of mathematical symbols or sentences, understanding the concept of multiplying fractions by integers, representing problems in the form of pictures or mathematics, developing strategies in solving problems, and building mathematical reasoning.

The difficulties of moderate ability students are representing problems in the form of pictures and mathematics, understanding problems, building mathematical reasoning, developing strategies in solving problems, and understanding fraction concepts. The difficulties of high-ability students are understanding problems, representing problems in the form of pictures, building strategies for solving problems, and mathematical reasoning. So the implication of this study shows that what must be improved is the negative mathematical disposition of students to be positive, by improving the quality of mathematics learning in elementary schools.

REFERENCES

Ab, J. S., Margono, G., & Rahayu, W. (2019). The Logical Thinking Ability: Mathematical Disposition and Self-Regulated Learning. *Journal of Physics: Conference Series*, *1155*(1). https://doi.org/10.1088/1742-6596/1155/1/012092

Ab, J. Sutrisno. (2020). Self-regulated learning: Intelligence quotient and mathematical disposition. *Journal of Physics: Conference Series*, *1422*(1). https://doi.org/10.1088/1742-6596/1422/1/012020

Almerino, Jr., P. M., Etcuban, J. O., De Jose, C. G., & Almerino, J. G. F. (2019). Students' Affective Belief as the Component in Mathematical Disposition. *International Electronic Journal of Mathematics Education*, *14*(3), 475–487. https://doi.org/10.29333/iejme/5750

Baumgartner, W. L., Spangenberg, E. D., & Lautenbach, G. V. (2021). Developing Algebraic Knowledge: Foundation Programme ex-Mathematical Literacy Students' Perceptions. *Eurasia Journal of Mathematics, Science and Technology Education*, *17*(11), em2026. https://doi.org/10.29333/ejmste/11245

Chasanah, C., Riyadi, & Usodo, B. (2020). *Analysis of Written Mathematical Communication Skills of Elementary School Students*. *397*(21), 648–656. https://doi.org/10.2991/assehr.k.200129.082

Clements, D. H., & Sarama, J. (2020). Learning and Teaching Early Math. *Learning and Teaching Early Math*. https://doi.org/10.4324/9781003083528

Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage publications.

Fery, M. F., Wahyudin, & Tatang, H. (2017). Improving primary students mathematical literacy through problem based learning and direct instruction. *Educational Research and Reviews*, *12*(4), 212–219. https://doi.org/10.5897/err2016.3072

Fishbein, B., Pirls, T. &, Foy, P., & Yin, L. (2021). *TIMSS 2019 USER GUIDE FOR THE INTERNATIONAL DATABASE Guide for the International Database*.

Gabriel, F., Signolet, J., & Westwell, M. (2018). A machine learning approach to investigating the effects of mathematics dispositions on mathematical literacy. *International Journal of Research and Method in Education*, *41*(3), 306–327. https://doi.org/10.1080/1743727X.2017.1301916

Habsah, F. (2017). Developing teaching material based on realistic mathematics andoriented to the mathematical reasoning and mathematical communication. *Jurnal Riset Pendidikan Matematika*, *4*(1), 43. https://doi.org/10.21831/jrpm.v4i1.10199

Hasanah, S. I., Tafrilyanto, C. F., & Aini, Y. (2019). Mathematical Reasoning: The characteristics of students' mathematical abilities in problem solving. *Journal of Physics: Conference Series*, *1188*(1). https://doi.org/10.1088/1742-6596/1188/1/012057

Hutajulu, M., Wijaya, T. T., & Hidayat, W. (2019). the Effect of Mathematical Disposition and Learning Motivation on Problem Solving: an Analysis. *Infinity Journal*, *8*(2), 229. https://doi.org/10.22460/infinity.v8i2.p229-238

Hwang, J., & Ham, Y. (2021). Relationship between mathematical literacy and opportunity to learn with different types of mathematical tasks. *Journal on Mathematics Education*, *12*(2), 199–222. https://doi.org/10.22342/JME.12.2.13625.199-222

Khaerunisak, K., Kartono, K., Hidayah, I., & Fahmi, A. Y. (2017). the Analysis of Diagnostic Assesment Result in Pisa Mathematical Literacy Based on Students Self-Efficacy in Rme Learning. *Infinity Journal*, *6*(1), 77. https://doi.org/10.22460/infinity.v6i1.236

Kusmaryono, I., Suyitno, H., Dwijanto, D., & Dwidayati, N. (2019). The Effect of Mathematical Disposition on Mathematical Power Formation: Review of Dispositional Mental Functions. International Journal of Instruction, 12(1), 343-356.

Kusumaningsih, W., Saputra, H. A., & Aini, A. N. (2019). Cognitive style and gender differences in a conceptual understanding of mathematics students. *Journal of Physics: Conference Series*, *1280*(4). https://doi.org/10.1088/1742-6596/1280/4/042017

Lestari, L., & Surya, E. (2017). The Effectiveness of Realistic Mathematics Education Approach on Ability of Students' Mathematical Concept Understanding. *International Journal of Sciences: Basic and Applied Research*, *34*(1), 91–100. http://gssrr.org/index.php?journal=JournalOfBasicAndApplied

Lestari, W., & Jailani. (2018). Enhancing an Ability Mathematical Reasoning through Metacognitive Strategies. *Journal of Physics: Conference Series*, *1097*(1). https://doi.org/10.1088/1742-6596/1097/1/012117

Machaba, F. M. (2018). Pedagogical demands in mathematics and mathematical literacy: A case of mathematics and mathematical literacy teachers and facilitators. *Eurasia Journal of Mathematics, Science and Technology Education*, *14*(1), 95–108. https://doi.org/10.12973/ejmste/78243

OECD, P. (2016). Science Competencies for Tomorrow's World, Volume 1: Analysis

Retnawati, H., Kartowagiran, B., Arlinwibowo, J., & Sulistyaningsih, E. (2017). Why are the mathematics national examination items difficult and what is teachers' strategy to overcome it? *International Journal of Instruction*, *10*(3), 257–276. https://doi.org/10.12973/iji.2017.10317a

Rizki, L. M., & Priatna, N. (2019). Mathematical literacy as the 21st century skill. *Journal of Physics: Conference Series*, *1157*(4). https://doi.org/10.1088/1742-6596/1157/4/042088

Sari, D. P., Darhim, & Rosjanuardi, R. (2018). Errors of students learning with react strategy in solving the problems of mathematical representation ability. *Journal on Mathematics Education*, *9*(1), 121–128. https://doi.org/10.22342/jme.9.1.4378.121-128

Setiani, C., Waluya, S. B., & Wardono. (2018). Analysis of mathematical literacy ability based on self-efficacy in model eliciting activities using metaphorical thinking approach. *Journal of Physics: Conference Series*, *983*(1). https://doi.org/10.1088/1742-6596/983/1/012139

Setiawati, S., Herman, T., & Jupri, A. (2017). Investigating middle school students' difficulties in mathematical literacy problems level 1 and 2. *Journal of Physics: Conference Series*, *909*(1). https://doi.org/10.1088/1742-6596/909/1/012063

Siswono, T. Y. E., Hartono, S., Kohar, A. W., Karim, K., & Lastiningsih, N. (2019). How do prospective teachers manage students' learning of mathematics? *TEM Journal*, *8*(2), 677–685. https://doi.org/10.18421/TEM82-49

Suharta, I. G. P., & Suarjana, I. M. (2018). A case study on mathematical literacy of prospective elementary school teachers. *International Journal of Instruction*, *11*(2), 413–424. https://doi.org/10.12973/iji.2018.11228a

Tambunan, H. (2018). Impact of Heuristic Strategy on Students' Mathematics Ability in High Order Thinking. *International Electronic Journal of Mathematics Education*, *13*(3), 321–328. https://doi.org/10.12973/iejme/3928

Tambunan, H. (2019). The Effectiveness of the Problem Solving Strategy and the Scientific Approach to Students' Mathematical Capabilities in High Order Thinking Skills. *International Electronic Journal of Mathematics Education*, *14*(2), 293–302. https://doi.org/10.29333/iejme/5715

Tokada, D., Herman, T., & Suhendra. (2017). Discovery Learning for Mathematical Literacy Ability. *Journal of Physics: Conference Series*, *895*(1). https://doi.org/10.1088/1742-6596/895/1/012077

Wilkerson, J. B. (2021). Cultivating a Productive-Disposition Toward Mathematics by Engaging in Service-Learning. *Primus*, *31*(8), 869–882. https://doi.org/10.1080/10511970.2020.1776803

Yaniawati, R. P., Indrawan, R., & Setiawan, G. (2019). Core model on improving mathematical communication and connection, analysis of students' mathematical disposition. *International Journal of Instruction*, *12*(4), 639–654. https://doi.org/10.29333/iji.2019.12441a