Analysis of Reading and Writing Skills on the Ability to Solve Math Story Problems of Junior High School Students in Saribudolok

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ABSTRACT	
	This study aims to analyze the relationship between reading and writing skills and students' ability to solve mathematical problems in the form of stories. The research participants consisted of six ninth grade junior high school students who were grouped based on their average daily math test scores, referring to the Minimum Completion Criteria (KKM). The research method applied was qualitative description. The data sources included test results, observations and interviews. The mathematical literacy test consisted of six questions that followed the PISA mathematical literacy indicators. The test results showed variations in students' ability to solve math problems, especially chance problems. Most students were able to solve routine problems (level 1), interpret problems (level 2), and use problem solving strategies (level 3). However, they face difficulties in problems that require the integration of different representations with concrete situations (level 4). An analysis of the test results showed that the group of students with higher score categories tended to be better at answering the questions. These results show the importance of reading and writing skills in improving students' ability to understand and solve math story problems.

INTRODUCTION

The importance of mastering reading, writing and arithmetic skills is an undeniable starting point in basic education. This is regulated in Law No. 20 of 2003 concerning the National Education System which emphasizes the need for curriculum materials that include learning Indonesian (reading and writing) and mathematics (including arithmetic) (Ritno, et al., 2021).

One of the subjects taught at all levels of education is mathematics. Many students feel that math is boring and less interesting because it is considered difficult and complicated, reflecting a negative perception of the subject. In order for students to

have the ability to access, process and utilize information in the face of dynamic, competitive and uncertain challenges, basic mathematical knowledge is needed. Not only math, language skills are also one of the important basic skills for junior high school students. Language proficiency gives individuals the skills to communicate, both orally and in writing, in one-way or two-way communication. With good communication skills, in the future a person can overcome challenges in his life, both directly and indirectly related to language and communication (Widyanto, 2017).

Humans have several skills in language ability. According to Tarigan (in Heryati and Noor Komari Pratiwi, 2021). One of these aspects is reading and writing skills. Reading acts as a tool to gain knowledge about things that are not yet known and desired. Through reading skills, students can gain a deep understanding of various types of texts. Hodgson revealed that reading is a process in which the reader tries to understand the message conveyed by the author through written text. This process involves understanding groups of words seen at first glance as well as the meaning of individual words (Tarigan in Heryati and Noor Komari Pratiwi, 2021). Reading in mathematics involves understanding the language of mathematics, which includes the interpretation of symbols, algebraic equations, diagrams, and graphs.

In addition, the aspect of language that is often considered complicated and a complaint for many people is writing. Like other language skills, writing is a skill that must be learned through continuous and systematic practice.Educational practitioners always recommend practicing in a disciplined manner to develop writing skills.However, to succeed in such practice, not only willpower is required, but also knowledge, concepts, principles and procedures that underlie writing activities.Therefore, there are three main elements needed to achieve good writing skills: writing practice, knowledge of writing and writing, and knowledge of the material to be written.Writing skills basically reproduce information and ideas into written form.By writing, a person can reflect their mindset, convey information and ideas, and overcome various problems, including those related to mathematics (Ritno, et al., 2021).

Math story problems are one type of reading text that requires reading and writing skills. Story problems are usually presented in the form of narratives that are clear and easy to understand.According to Endang Setyo Wirani and Sri Harmini (in Sigit Widiyanto, 2017), math story problems contain words or sentences that contain mathematical concepts.The presentation of math story problems in writing requires students' ability to know and understand the problems contained in the problem before carrying out the solution process.The importance of this story problem is to test students' ability to apply mathematical concepts in everyday life.Through solving story problems, students are expected to identify problems that need to be solved using

mathematical language, such as addition, subtraction, division, and multiplication (Dwidarti et al., 2019).

Table 1 below shows the criteria for reading and writing skills (literacy) levels that are adjusted to the levels developed by PISA (Purwasih et al., 2018).

Table 1.
Criteria for Reading and Writing Skills (Literacy)

Level	Description
1	Students have the capability to complete everyday tasks using the knowledge they have. They can also solve problems of a general nature.
2	Students are able to analyze mathematical problems and find solutions by applying appropriate formulas.
3	Students have the capability to carry out the procedures needed to solve mathematical problems. They are also able to select effective problem-solving strategies.
4	Students can work with mathematical models and are able to integrate different representations. They can also relate their mathematical understanding to real world situations.
5	Students have the capability to handle mathematical models in complex situations. They are also able to solve complex mathematical problems.
6	Students can use their reasoning skills in solving mathematical problems. They are also able to make generalizations, formulate new concepts, and communicate their findings clearly and systematically.

Students at the junior high school level should already have sufficient reading and writing skills to solve story problems. They should have been equipped with reading and writing skills that can help them find and understand the problems contained in math story problems. However, in reality, there are still students who have difficulty in solving math story problems because they do not understand the text of the problem well. This is consistent with research that shows that many students feel that reading and writing are boring activities, which makes it difficult for them to understand the content of reading well (Hidayah & Hermansyah, 2016). This finding is also consistent with another study which found that many students, including those with high mathematical ability, have difficulty in solving math story problems (Dwidarti et al., 2019).

Based on the description of the background of the problem above, this study was conducted to find out "how reading and writing skills affect the ability to solve math story problems of junior high school students in Saribudolok".

RESEARCH METHODE

This study applied a descriptive qualitative approach in Saribudolok for junior high school students with an age range of around 15 years, in line with the PISA test. The research was conducted from Friday-Saturday, April 26-27, 2024. The research subjects were selected based on age criteria according to the PISA test standards. A total of six students from grade IX of junior high school were selected based on the average assessment of daily math tests that refer to the Minimum Completeness Criteria (KKM). A customized test from PISA was used to evaluate the mathematical literacy skills of the ninth grade students. The test instrument covered various materials such as chance, algebra, statistics, geometry and mathematical literacy indicators.

Table 2.
Instrumen Covered Various

No	Score	Category	Number of Students
1	More than 78	High	6
2	Equal to 78	Medium	6
3	Less than 78	Low	6

The test instrument consists of four questions that have passed the validation process by experts and peers. These questions cover the range of mathematical reading and writing skills from level 1 to 6. In addition to being an evaluation tool in the research, this math reading and writing test also serves as an exercise for ninth grade students to face the School Examination. The researcher randomly selected four subjects to represent each test instrument, with S1 representing test instrument number 1, S2 for test instrument number 2, S3 for test instrument number 3, and S4 for test instrument number 4.

The research results were collected by means of observation, tests, and interviews. Tests of mathematical reading and writing skills, which are indicators of mathematical reading and writing skills used by PISA. In addition, observations and interviews were conducted to observe and understand the achievement of indicators of students' mathematical reading and writing levels that were not visible through tests alone (Simarmata et al., 2020). This aims to get a more comprehensive picture of students' abilities in the context of reading and writing mathematics. In addition, researchers also assessed the level of mathematical ability of each subject based on the data collected.

The data collected included observations made before the test, written answers from the test that reflected students' ability to solve math problems, and information about students' math learning habits. Data collected from interviews were in the form of students' responses to the challenges faced in mathematical story problems. Meanwhile,

the qualitative analysis method was used to analyze the data through the stages of reducing, displaying, and drawing conclusions.

The tests that will be tested

1. A farmer will buy 3 ducks and 2 chickens from a trader who has 6 ducks and 4 chickens. In how many ways can the farmer choose the animals he wants?

2. Endo has a jar containing 10 candies, 6 chocolate candies and 4 caramel candies. If he chooses one candy at random from the jar, what is his probability of choosing a chocolate candy?

3. Nafa is the owner of a bookstore, where she has 30 English books, 20 math books, and 10 science books. From each of these book categories, 5 books are randomly selected to be displayed on the exhibition shelf. If a customer comes to the store and chooses one book from the display shelf at random, what is the probability that he/she will choose a math book?

In class VIII-B, a class president and vice president will be elected. The class consists of 16 boys and 24 girls. The probability of electing a female class president and a male class vice president and a male class vice president is

RESULT AND DISCUSSION
Result

After collecting the test results that have been done by the subject, then the researcher analyzes the subject's answers with the table of the level of students' mathematical reading and writing skills (literacy) that have been described previously related to the story form opportunity material. This analysis is based on a review of the book Purwasih et al. in 2018.

Table 3.
Indicators of the Level of Mathematical Reading and Writing Skills (Literacy) Performed by the Subject

Question code	Question number			
	1	2	3	4
	Student level indicators			
S1	L1,L2,L3,L6	-	-	-
S2	-	L2,L3,L6	-	-
S3	-	-	L1,L2,L3	-
S4	-	-	-	L4

Description: L1: Students have the capability to complete everyday tasks using their existing knowledge. They can also solve problems of a general nature; L2: Students are able to analyze mathematical problems and find solutions by applying appropriate formulas; L3: Students have the capability to carry out the necessary procedures in

solving mathematical problems. They are also able to select effective problem solving strategies; L4: Students can work with mathematical models and are able to integrate different representations. They can also relate their mathematical understanding to real world situations; L5: Students have the capability to handle mathematical models in complex situations. They are also able to solve complex mathematical problems; L6: Students can use their reasoning skills in solving mathematical problems. They are also able to make generalizations, formulate new concepts, and communicate their findings clearly and systematically.

Table 4.
Percentage of each level.

Level	Persentase (%)
L1	18,1
L2	27,2
L3	27,2
L4	9,0
L5	-
L6	18,1

Discussion

The first problem is a relatively easy type of problem, which can be done by students with low math skills. This problem is categorized as level 1, 2, 3, and 6, with the topic of chance. For example, one way of working on problem number 1 can be seen in the illustration below.
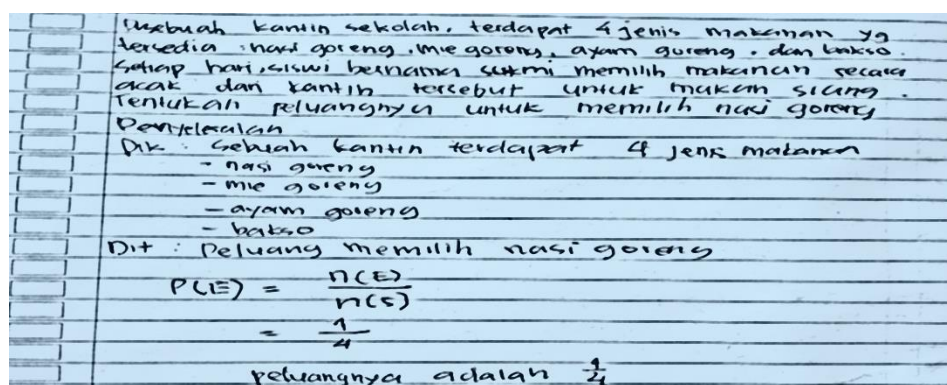

Figure 1.
Working on Problem

Level 1 mathematical reading and writing ability indicators refer to students' ability to complete everyday tasks using the knowledge they have. They can also solve problems of a general nature. Analysis of students' responses shows that they can answer questions that have a common and familiar context. They can access all relevant data available in clear statements. Students can identify the information given and carry

out general procedures according to clear instructions, and act on the directions given. Then, for level 2 indicators, students are able to analyze mathematical problems and find solutions by applying appropriate formulas. This can be seen from the way the subject uses the formula P(E)= $\frac{n\,(E)}{n\,(S)}$ to help in finding answers. As for level 3 indicators, students have the capability to carry out the procedures needed in solving mathematical problems. They are also able to choose effective problem-solving strategies. This is evidenced by students' ability to simplify the concept of the problem to be simpler, allowing them to solve problems more efficiently. Then level 3 is that students have the capability to carry out the procedures needed in solving mathematical problems. They are also able to choose effective problem-solving strategies, as evidenced by making the concept of the problem simpler. The subject elaborated between the known and questioned information of the problem, so as to focus the selection of the solution to the problem. Furthermore, level 6 is using reasoning in solving systematic problems. The subject can solve the problem systematically even though the problem confuses the reader a little with the sentence "choosing food randomly", which might lead to other answers such as $\frac{4}{4}$.
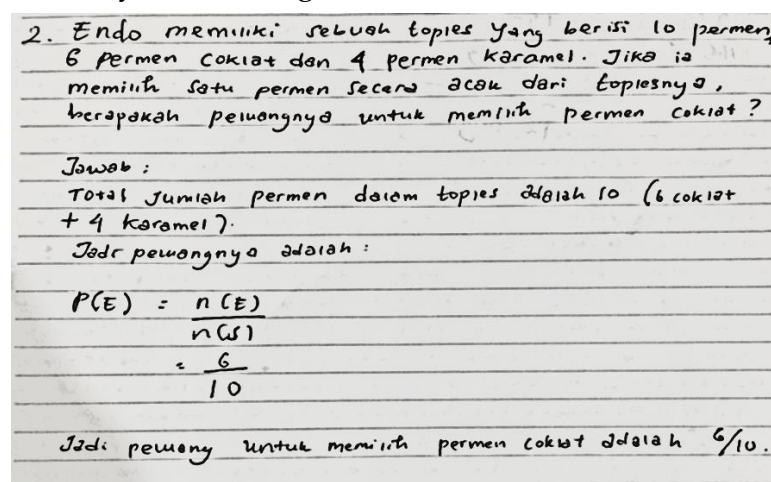

Figure 2.
Working on Problem

Problem number 2 is included in the category of level 2, 3, and 6 questions in the probability material done by the subject. The level 2 mathematical literacy indicator refers to the student's ability to analyze mathematical problems and find solutions by applying appropriate formulas. In this case, the subject successfully applied the formula P(E)=n(E)/n(S), where n(E) is the number of chocolate candies selected and n(S) is the total number of candies. Based on this, it can be seen that students are able to use relevant formulas to solve the given opportunity problems. Then the level 3 and 6 indicators are that students have the capability to carry out the procedures needed in solving mathematical problems. They are also able to choose effective problem solving strategies. Students can also use their reasoning skills in solving mathematical

problems. They are also able to make generalizations, formulate new concepts, and communicate their findings clearly and systematically. This can be seen from the students' understanding in simplifying the problems in the story problem and understanding in substituting numbers into the formula. After seeing the results of the work on this second problem, the subject can do the problem well but in mathematical completion, the numbers from the results can be simplified again to be $\frac{3}{5}$. Through the solutions made by these students, they can interpret and recognize mathematical situations in contexts that are relevant to the real world. This shows the students' ability to apply mathematical thinking in a broader and more useful situation in everyday life. They can sort out the information in the problem more simply, so that it can be understood easily.

Students can state the reason directly and interpret it literally. Students can use concepts in opportunities to interpret the problem and solve the solution. Based on the results of interviews with other subjects who answered inaccurately, the answers of other subjects were the same, they did not use the formula in solving the opportunity problem so that it was difficult to solve the problem. This means that students are confused by story problems and have difficulty interpreting problems. Students are confused about what formula to use in the context of this opportunity. Students prefer to engage in direct and organized questions about what they know and what is asked of them because they can answer logically without linking to a formula, rather than questions about stories like this.

In problem number 3, which has a difficulty level covering levels 1, 2, and 3, students were able to solve the problem with good ability. This can be illustrated by an example of one student's solution illustrated in Figure 3.
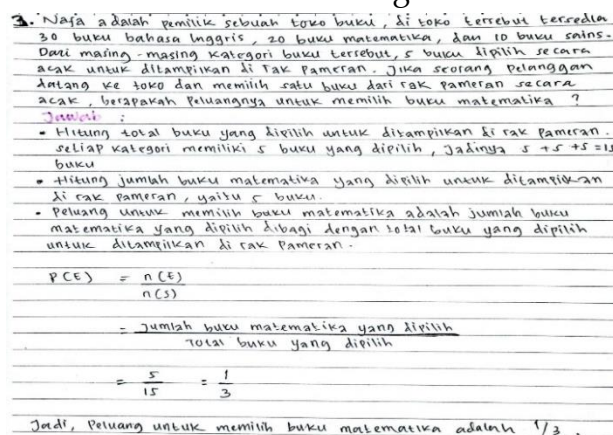

Figure 3.
Working on Problem

Level 1 mathematical literacy indicators refer to students' ability to complete everyday tasks using the knowledge they have. They can also solve problems of a general nature. Meanwhile, level 2 mathematical literacy indicators show students'

ability to analyze mathematical problems and find solutions by applying appropriate formulas. Examples of formulas used, such as $P(E) = \frac{n(E)}{n(S)}$, i where n(E) is the number of math books selected and n(S) is the total number of books selected, is evidence of students' ability to apply formulas in relevant contexts. Then the indicator of level 3 math reading and writing skills is when students demonstrate the ability to carry out the procedures needed to solve mathematical problems. They are also able to choose effective problem-solving strategies and are able to implement procedures that require a sequence of actions and can apply simple strategies in solving problems. In the case of problem number 3, only three students managed to answer correctly, indicating that the problem falls into the category of level 3 reading and writing skills in the topic of opportunities.

Problem number 4 falls into the category of mathematical reading and writing skills at level 4 in the topic of opportunities. Indicators of level 4 mathematical reading and writing skills refer to students' ability to integrate different representations. They can also relate their mathematical understanding to real-world situations. Furthermore, the attached picture is one example of the student's solution.
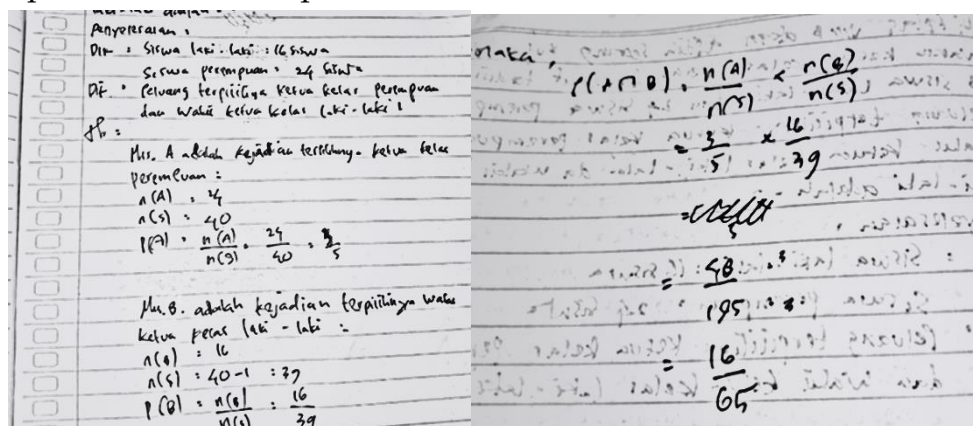

Figure 4.
Working on Problem

Students demonstrate the ability to work effectively with models in both concrete and complex situations. They have the ability to choose wisely and combine different representations, then relate them to relevant real situations. Students can use their skills to structure flexible reasoning and views according to the given context. They can explain and communicate their interpretations and actions appropriately. In addition, students can also interpret different sources of information and present clear reasons. Their ability to communicate the results of their interpretations and reasoning is also visible.

The results of interviews with subjects who have not answered correctly show that students have difficulty when working on problems that require a long process. They

also had difficulty in interpreting the problem and drawing the right conclusions from the questions asked.

CONCLUSION

The conclusion obtained from this study is that students' mathematical literacy skills in solving math story problems, namely opportunities, are very diverse, reflected in the varying levels of skill levels. Most students are able to complete daily tasks using the knowledge they have (level 1), able to analyze mathematical problems and find solutions by applying appropriate formulas (level 2), and carry out the procedures needed in solving mathematical problems and choosing effective problem-solving strategies (level 3). However, there are challenges in solving problems that require a long process and the selection of appropriate strategies, especially in problems that require the integration of different representations with concrete situations (level 4). Although the use of formulas helped in solving the problems, some students still had difficulty in connecting the context of the problem with the right formula. There was progress from simpler to more complex problems, but further efforts are needed to improve students' ability to overcome these difficulties and strengthen their skills in connecting mathematical concepts with real-world situations.

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