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Mathematical Literacy Skills of Junior High School Students in Border Schools in Solving Minimum Competency Assessment-Based Problems

Samuel Igo Leton[1*], Meryani Lakapu[1], Wilfridus Beda Nuba Dosinaeng[1], Nelly Fitriani[2], & Oktovianus Yongki Amsikan[3]

[1]Department of Mathematics Education, Universitas Katolik Widya Mandira Kupang, Indonesia

[2]Department of Mathematics Education, Institut Keguruan dan Ilmu Pendidikan Siliwangi Bandung, Indonesia

[3]Sekolah Menengah Pertama Lorotuan Atambua, Indonesia

Abstract: Literacy skills are one of the mathematical abilities that all students need to have in today's global era. However, not all students in border schools have good mathematical literacy skills. This type of research is descriptive qualitative which aims to get an overview of the mathematical literacy skills of students in border areas in solving Minimum Competency Assessment-based problems and also identify factors that influence these skills. This study involved all 57 seventh grade students in the first semester of SPMN Lorontuan Atambua - NTT. The test questions were four numbers in the form of true and false, multiple correct answers and short form. The results of the analysis found that some of them could not read fluently; not all students had a good understanding of basic mathematical concepts; lack of learning experience of contextual problems or story problems that caused them to have difficulty understanding the problem, choosing the mathematical concept used to answer the problem and could not analyze the information provided. The reconstruction that we provide is the need to build a strong mathematical understanding by designing mathematics learning that integrates local wisdom and technology and provides them with varied learning experiences on story problems.

Keywords: math skills, literacy, schools at the border.

▪ INTRODUCTION

Literacy is one of the mathematical skills that all students need to have in today's global era (Genlott and Grönlund 2016). With the rapid development of technology and information, literacy has become more than just reading and writing, but also includes critical thinking skills and is essential in modern life (Guerrero and Sjöström 2024; Suarez-Brito et al. 2022). Literacy skills are an important aspect of education that is directly related to an individual's ability to apply mathematical concepts and skills to solve problems in various real-life situations (Komarudin, Suherman, and Vidákovich 2024; Thanheiser and Mamolo 2024). Thus, literacy skills are one of the important factors to improve the quality of life of individuals and society (Stevenson, Carrier, and Peterson 2014). Literacy skills are also one of the factors in shaping students' basic skills. Literacy skills are also one of the factors in shaping students' basic skills that can be useful in everyday life (Muhaimin et al. 2024; Suarez-Brito et al. 2022). The formation of basic skills is related to logical thinking patterns, practicing how to think in making decisions based on data and information, and practicing in solving problems (Mahanal et al. 2019; Sachdeva and Eggen 2021). Literacy skills are considered important to be taught to every student since elementary school so that they have the ability to analyze, give reasons, and communicate ideas effectively to solve certain problems (Purnomo, Rahayu, and Agustini 2023).

Samuel Igo Leton
*Email: letonsamuel@unwira.ac.id

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In Indonesia, mathematical literacy is also a major concern, especially in facing global challenges. Referring to data from the Organization for Economic Co-operation and Development (OECD), which released the results of the Program for international Student Assessment (PISA) test in 2022, shows a decrease in reading, mathematics and science scores. Reading skills dropped from 371 to 359; math skills also decreased from 379 to 366 (Organisation for Economic Co-operation and Development (OECD) 2023). These results reflect their level of ability to read, think critically, interpret information and solve problems in various life contexts. The PISA test results also show how well the Indonesian education system prepares students for real-life challenges and future success (Sjøberg and Jenkins 2022). In addition, the decline in the scores of students in Indonesia shows the low competence of 15-year-old students in 21st century skills which include critical thinking, problem solving, and other higher-order thinking skills (HOTS) that are still not adequately achieved (Bilad, Zubaidah, and Prayogi 2024; Diyah Nur Rahmawati, Tarzan Purnomo, and Sunu Kuntjoro 2022), even though one of the components needed to build 21st century skills is mathematical literacy (Rizki and Priatna 2019).

Mathematical literacy has become a focus of current research especially in the context of primary education. Previous studies have shown that mathematical literacy is influenced by various factors, including socio-economic background, teacher quality, availability of learning resources and student motivation (Fatwana et al. 2024; Kontaş and Özcan 2022; Lee et al. 2023). In addition, the results of other studies also show that there is a correlation between the quality of education and economic growth, with mathematical literacy as one of the main indicators (Goczek, Witkowska, and Witkowski 2021; Purnomo et al. 2023). In addition, research conducted by Fenanlampir et al. (2019) through the Trends in International Mathematics and Science Study (TIMSS) showed that countries with high levels of mathematical literacy tend to have good education systems, adequate resources, and effective learning approaches. Literacy and Numeracy play an important role in improving the quality of education in Indonesia (Hamdu et al. 2023; Rahmania et al. 2024).

The results of previous studies show that the mathematical literacy skills of Indonesian students are generally not encouraging (Aisyah and Juandi 2022; Organisation for Economic Co-operation and Development (OECD) 2023). The results of the PISA survey in 2022 show that the literacy skills of Indonesian students have not shown satisfactory results (366 points) and are below the average score (472 points) (Organisation for Economic Co-operation and Development (OECD) 2023). An overview of primary school students' very low mathematical literacy skills in solving mathematical literacy problems (Ekawati, Susanti, and Chen 2020). The mathematical literacy skills of junior high school students in solving AKM problems with flat building materials, namely triangles and quadrilaterals, are still below average (Widianti et al. 2021). The same problems are also experienced in schools located in border areas and are often more complex than those in urban areas. Remote geographical conditions, limited educational facilities, and low levels of economic welfare are factors that can affect students' mathematical literacy skills (Muhaimin et al. 2024; Umar and Widodo 2022). Students' level of understanding of digital literacy is still very low and this has an impact on students' soft skills behavior (Al-Sharhan et al. n.d.; Jewarut and Sumarni 2022).

The limitations of border schools raise concerns about the future of education in border areas. Students in remote areas of Indonesia have lower mathematical literacy

skills compared to students in urban areas (Syamsuri and Bancong 2022; Yudiana, Putri, and Antara 2023). Therefore, they need to be trained with PISA-like math problems and in the learning process not only train them to apply mathematical concepts and procedures to solve problems, but also train them to represent mathematical situations in real-world contexts (local wisdom) into mathematical models and interpret the mathematical solutions that have been obtained back to the real-world context (Machromah et al. 2020; Zulkardi and Kohar 2018).

Lorontuan Atambua Junior High School, as one of the schools located in the Indonesia-Timor Leste border area, faces various challenges in improving the quality of students' mathematical literacy. Based on initial observations and interviews with several teachers, it was found that students at Lorotuan Atambua Junior High School have diverse mathematical literacy skills with most students still at a low level in understanding and applying basic mathematical concepts. The researcher suspects that this is due to limited infrastructure, limited access to educational resources and socio-economic conditions that affect the learning process in schools as well as limited access to learning resources, lack of teacher training and lack of support from parents. This research specifically examines the mathematical literacy skills of students in border schools, such as Lorotuan Atambua Junior High School, which is still rarely done. This study not only adds to the existing literature, but also provides a new perspective on students' mathematical literacy skills in border areas and also to obtain an overview of students' mathematical literacy skills at Lorotuan Atambua Junior High School. This study also identifies specific factors that influence these skills. With this comprehensive approach, this research is expected to provide more effective recommendations for improving mathematical literacy in border schools. Thus, this research is not only beneficial for improving students' mathematical literacy, but also for developing innovative and contextualized learning strategies that can be applied in border schools. Learning approaches that are adapted to local conditions are expected to help students better understand mathematical concepts, so that their mathematical literacy skills can improve significantly.

▪ METHOD

Participants

This is a qualitative study involved 12 (twelve) students of Lorotuan Atambua Junior High School as the subjects. Firstly, all 57 seventh grade students in the first semester of the 2024/2025 academic year at Lorotuan Atambua Junior High School, East Nusa Tenggara were given a test to do. 12 (twelve) of them were purposively selected to be interviewed based on the following criteria (Jhon W. Creswell 2007). They were asked to explain how they read and understood the questions to how they thought about solving the test questions.

Research Design and Procedure

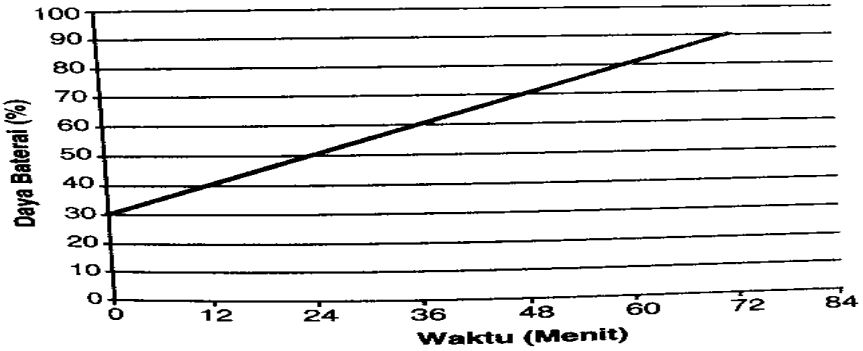
This research uses descriptive qualitative design which aims to obtain an overview of students' mathematical literacy skills in solving Minimum Competency Assessment based questions consisting of literacy and numeracy test. Firstly, researcher reviewed literatures about mathematical literacy skills, curriculum, and Minimum Competency Assessment that consist of literacy and numeracy competencies. Secondly, researcher developed research instruments including: 1) test based on Minimum Competency

Assessment that adjusted with current curriculum for VII grade; and 2) interview guidelines. After developed, these instruments were validated by 1 (one) mathematics education lecturer and 1 (one) mathematics teacher in grade VII. After the instruments were declared valid, the instruments were used by researcher for data collection. Thirdly, after being collected, research data were analysed using qualitative data analysis steps from Miles & Huberman (Jhon W. Creswell 2007) including: reduce data, display data, and make conclusion. The validity of research results are guaranteed by using technique triangulation that compared data which were collected from test and interview.

Instruments

In the implementation stage, we administered the literacy test and conducted interviews. The test was developed by researcher which consists of 2 (two) questions in the form of true or false questions with algebra and number domains; 1 question in the form of several correct answers with the domain of whole numbers; and 1 question in the form of short answers with the domain of algebra. This test is focused on measuring students' mathematical literacy skills, so that after being completed by students, every number in this test was analysed by using indicators of mathematical literacy abilities include: (1) using mathematics to solve problems in various contexts of daily life; (2) analyze information displayed in various forms (graphs, tables, sections, diagrams and so on); (3) Interpret the results of the analysis to predict and make decisions.

Cell phones are a trendy communication medium nowadays. Because of its importance, it needs maintenance. Every morning Anton charges his cell phone. The following graph presents the relationship between battery capacity (percent) and time (minutes) of charging Anton's cell phone.



Determine whether the following statements are true or false by placing a √ mark in the appropriate column.

No	Problem	True	False
a.	When charging started, the battery capacity percentage was 30%.		
b.	On charging the cell phone, Anton took 100 minutes.		
c.	After 36 minutes of charging, Anton's battery capacity is 60% charged		
d.	Anton's battery capacity is 80% charged after the phone has been on charge for 72 minutes.		

Mr. Hendrik owns a Honda Versa motorcycle that he usually uses to commute to work. Mr. Hendrik's motorcycle is also very fuel efficient. To cover a distance of 15 km, Mr. Hendrik only needs to use 3 liters of gasoline. If the gas tank of Mr. Hendrik's motorcycle is only filled with 12 liters of gasoline, the distance that Mr. Hendrik can travel using his motorcycle is....

Mr. Agus has a kiosk business selling Chicken Sausage. The Chicken Sausages are stored in five different refrigerators and each cabinet is labeled I, II, III, IV and V. Each freezer is set with the following temperatures

freezer	I	II	III	IV	V
temperatures	-2^0C	-5^0C	0^0C	-9^0C	-1^0C

Based on this information, choose the correct statement!

a) The temperature in refrigerator I is higher than the temperature in refrigerator II.
b) The cooler with the highest temperature is cooler III.
c) Refrigerator IV is the coldest among the four refrigerators.
d) The lowest temperature belongs to refrigerator V

Lena, Adi, Joni, Rio and Yanti went to a shoe shop. They bought shoes at different prices. Here are the prices of the shoes they bought.

- Lena bought shoes for Rp. 246.400.00.
- Adi bought shoes for Rp. 56.300.
- Joni bought shoes for Rp. 125.500.
- Rio bought shoes for Rp. 75.600.
- Yanti bought shoes for Rp. 279.800.

Which of the following statements is true

a) Rio's shoes cost seven hundred fifty-six thousand rupiah.
b) Lena's shoes cost two hundred forty-six thousand four hundred rupiahs
c) Adi's shoes for fifty-six thousand three hundred rupiahs

After developed, this test were validated by 1 (one) mathematics education lecturer and 1 (one) mathematics teacher in grade VII. In order to ensure that this instrument has been ready for use before being applied to research subjects, using Likert scale (1-5), there are two aspects that are measured in this process including: conformity with literacy abilities indicators and conformity with students level of knowledge.

Together with test, interview was designed by using literacy indicators. Using semi-structured interview, the questions are given to investigate students ability in solving Minimum Competency Asessment-based questions. Before being used, the interview guideline was validated by a lecturer from mathematical education study program.

By taken P as final score, f as the total score from each indicator, and N as maximum score, final score from validators for both test and interview guideline were analysed by using formula:

$$P = \frac{f}{N} \times 100\%$$

The criteria used in validation process to interpret final score from validators could be seen in Table 1 below.

Table 1. Validity criteria

Kriteria Validitas	Kategori
100%	Very Valid
$75\% \leq P < 100\%$	Valid
$50\% \leq P < 75\%$	Valid Enough
$25\% \leq P < 50\%$	Less Valid
$0\% \leq P < 25\%$	Not Valid

Data Analysis

This research data was collected through tests and interviews and tested for validity using triangulation techniques, namely comparing test data with interview data. After students completed their test, researcher interviewed them based on the questions on test and literacy indicators to explore their understanding, ideas, and the ways they chose to solve problems. During interviews, students were prohibited from checking their answer sheets again so that the researcher could check for the similarities between their writen and oral answers. The result is valid if both test and interview result meet the same indicators.

Data analysis in this study followed the Miles and Huberman model, namely; (1) data reduction; at this stage, information sharpening, information categorization and discarding unused data from test and interview results were carried out; (2) data presentation; at this stage, data classification and identification were carried out to draw conclusions based on indicators of students' mathematical literacy skills; (3) drawing conclusions; at this stage, conclusions were drawn in the form of a description of students' literacy skills, specific factors that influence literacy skills, and learning strategies and approaches adapted to local conditions that can be applied in border schools to improve students' mathematical literacy skills.

▪ RESULT AND DISSCUSSION

Instrument Validation

The final result from validator for test could be seen in Table 2 below.

Table 2. Final result of test validation

No.	Indicators	1st Validator	2nd Validator
A.	**The conformity with literacy abilities indicators**		
1.	Using mathematics to solve problems in various contexts of daily life	5	5
2.	Analyze information displayed in various forms (graphs, tables, sections, diagrams and so on	5	5
3.	Interpret the results of the analysis to predict and make decisions	4	4
B.	**The conformity with students' level of knowledge**		
1.	The appropriateness of data understanding and analysis problems for VII grade students	5	5
2.	The appropriateness of application of mathematics in real life context for VII grade students	4	5
3.	The appropriateness of critical and logical thinking skills level of VII grade students	5	4

No.	Indicators	1st Validator	2nd Validator
A.	**The conformity with literacy abilities indicators**		
	Total	28	28
	Mean	28	
	Final Score	93.33%	
	Criteria	**Very Valid**	

Based on Table 2, the average of validation score for test is 93,33% which is categorized as very valid (Table 1). It means that the test could be used for collecting data. For interview instrument, the final result from validator for test could be seen in Table 3 below.

Table 3. Final result of interview validation

No.	Indicators	Scores
1.	Using mathematics to solve problems in various contexts of daily life	10
2.	Analyze information displayed in various forms (graphs, tables, sections, diagrams and so on	8
3.	Interpret the results of the analysis to predict and make decisions	9
	Total	27
	Final Score	90%
	Criteria	**Very Valid**

Based on Table 3, the average of validation score for test is 90% which is categorized as very valid (Table 1). It means that the test could be used for collecting data.

Students' Answers Persentation

The mathematical literacy test was given to 57 seventh grade students and 12 students were purposively selected for interviews. The presentation of students' answers to the test questions given can be seen in Table 4 below.

Table 4. Students answer persentation

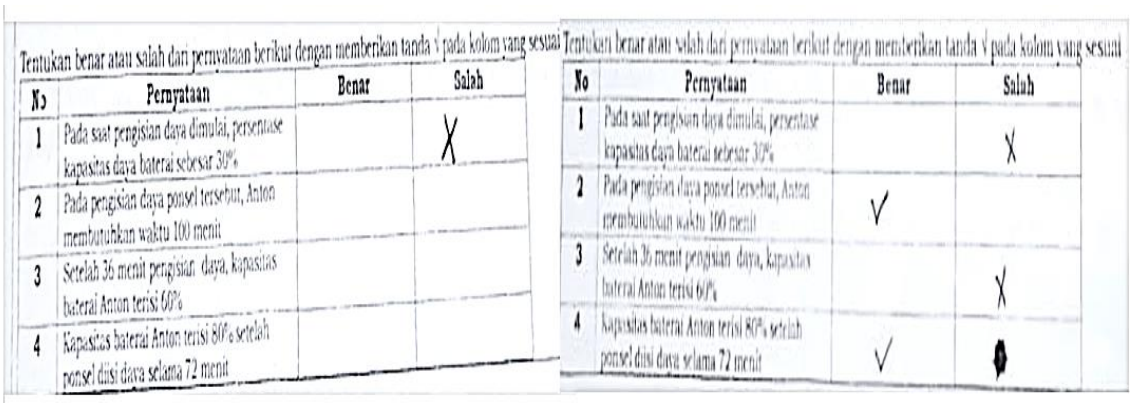
Question Number	Problem 1	Problem 2	Problem 3	Problem 4
% correct answer	24.56	21.05	61.40	33.33

Based on Table 4, we could see that the easiest problem for solving by students is the 4th question, and the hardest is the 2nd question. According to interview result, most of students revealed that they are familiar with temperature question like number 3, and buy and sell question like number 4 because they ever saw those question forms in their book, but they don't have any experience with questions like number 1 and 2. Particularly for Problem number 2 (the 2nd question), most students couldn't solve this problems because they didn't understand the problem. It is in line with Lagria et al (2023) that conveyed that the biggest difficulty faced by students in solving mathematical problems is their ability in understanding the problems.

The Results of The Analysis of Students' Mathematical Literacy Skills on Question 1

The first indicator is students ability in using mathematics to solve problems in various contexts of daily life. To analysed this ability, researcher divided the 1st indicator into 3 sub-indicators including: (1) the ability to choose right mathematical concept according to the problems, (2) the ability to use various strategies, and (3) the ability to find solution of real life-problem by using mathematics; divided the 2nd indicator into 2 sub-indicators including: (1) identify information, and (2) data interpretation; and divided the 3rd indicator into 2 sub-indicators including: (1) making prediction; and (2) making decision.

The information provided by question 1 is in the form of stories and graphs, so it requires the ability to read and analyze existing graphs to answer the question. Some examples of the work of students who could not answer correctly can be seen in Figure 1 below.



Tentukan benar atau salah dari pernyataan berikut dengan memberikan tanda √ pada kolom yang sesuai

No	Pernyataan	Benar	Salah
1	Pada saat pengisian daya dimulai, persentase kapasitas daya baterai sebesar 30%		X
2	Pada pengisian daya ponsel tersebut, Anton membutuhkan waktu 100 menit		
3	Setelah 36 menit pengisian daya, kapasitas baterai Anton terisi 60%		
4	Kapasitas baterai Anton terisi 80% setelah ponsel diisi daya selama 72 menit		

Tentukan benar atau salah dari pernyataan berikut dengan memberikan tanda √ pada kolom yang sesuai

No	Pernyataan	Benar	Salah
1	Pada saat pengisian daya dimulai, persentase kapasitas daya baterai sebesar 30%		X
2	Pada pengisian daya ponsel tersebut, Anton membutuhkan waktu 100 menit	√	
3	Setelah 36 menit pengisian daya, kapasitas baterai Anton terisi 60%		X
4	Kapasitas baterai Anton terisi 80% setelah ponsel diisi daya selama 72 menit	√	

Figure 1. Results of students' incorrect answers to question 1

Based on Figure 1 and some other incorrect answers, it appears that they were unable to understand the problem properly so they couldn't answer the problem correctly. Their inability to understand the problem is caused by their inability in analyze the information presented in the form of a graph. The cartesian diagram of the relationship between time (minutes) and battery power (%) starting from point (0.30), (24.50), (36.60) and so on, could not be well understood by them. This shows that the basic mathematical concepts understood by them related to cartesian diagrams are still very limited so that they are unable to analyze the information provided, interpret, and make decisions to answer the problem correctly.

In addition, there were only 24.56% of students who answered question 1 correctly. Some examples of student work that answered correctly can be seen in Figure 2 below.

Based on Figure 2, it appears that these students who answered correctly had the idea to make other illustrations in understanding the given problem. Based on the way they illustrate this problem in other forms such as sketching, making pairs and others, it shows that they understand the problem well.

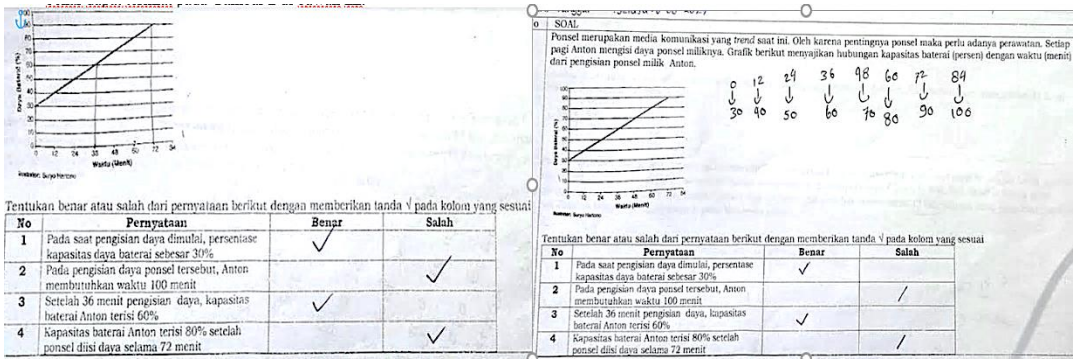


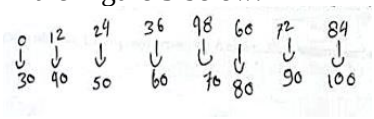
Figure 2. Results of students' correct answers to question 1

The results of our interviews with some of the students who could not answer correctly in question 1 showed that; (1) Most of them could not read fluently. This can be seen when we asked them to reread the questions given. Most of them still read by spelling word by word. This is why they could not understand the problem well; (2) their learning experience was not used to being given problems in the form of graphs so it was difficult for them to solve the problem; (3) lack of understanding of the basic concept of cartesian coordinates as pairs of points (x,y) causing them to be unable to see the relationship between time (minutes) and battery power (%) presented in the form of a graph.

The results of our interviews with subjects who answered this question correctly, they were able to read fluently, able to understand the problem presented in the form of a graph; When asked, "why do you make this auxiliary line?" According to the subject, this is the same as the pair of points and this is the intersection point between these (while making an auxiliary line between time and battery power). Regarding basic mathematical concepts, they also understood well the cartesian diagram so that they were able to analyze the information provided, interpret, and be able to make decisions to answer the question correctly. Overall, the result for question 1 could be seen on Table 5 below.

Table 5. The result for question 1

Sub-Indicator	Result from Test	Result from Interview
1st Indicator: Using mathematics to solve problems in various contexts of daily life		
The ability to choose right mathematical concept according to the problems	- 75,44% students couldn't choose right mathematical concept to determine the relationship between time and baterai capacity	- Students couldn't choose right mathematical concept because of several problems including: 1) their inability to read fluently, and 2) they didn't understand the basic concept of cartesian coordinates as pairs of points (x,y)

Sub-Indicator	Result from Test	Result from Interview
The ability to use various strategies	- Most of the students couldn't use various strategies to solve problem. - Several students used their own techniques to solve problem. For instance, one of them made one to one pairs to solve the problem as in the Figure 3 below:  **Figure 3.** A technique for Question 1 from a Student with the Right Answer	- Most of the students couldn't explain their strategy because they unable to see the relationship between time (minutes) and battery power (%) presented in the form of a graph. - Students, who could solve the problem, explained several techniques like skecthing or making pairs 1-1 that they used to solve the problem
The ability to find solution of real life-problem by using mathematics	There were only 24.56% of students who answered question 1 correctly	There were only 24.56% of students who answered question 1 correctly
2nd Indicator: Analyze information displayed in various forms		
The ability to identify information	Most of the students couldn't identify information from displayed graph	Students, who couldn't identify information from displayed graph, couldn't explain the basic concept of cartesian coordinates as pairs of points (x,y) in question 1
The ability to interpretate data	Most of the students couldn't interpretate data from displayed graph	Most of the students couldn't explain their interpretation on data from displayed graph
3rd Indicator: Interpret the results of the analysis to predict and make decisions		
The ability to making prediction	Most of the students couldn't predict when the battery will be full charged	Most of the students couldn't predict when the battery would be full charged as the result of their inability to analyze the graph
The ability to making decision	Most of the students couldn't determine the percentage of battery after being charged in certain time based on the graph	Students couldn't explain the percentage of battery after being charged as the result of their inability to analyze the graph

The results showed that a significant number of students struggled to select appropriate mathematical concepts and strategies to solve real-life problems, particularly regarding the relationship between time and battery capacity, with only 24.56% answering correctly. Many students lacked understanding of basic concepts such as Cartesian coordinates, which affected their ability to interpret graphs and identify information. As a result, their difficulties extended to making predictions and decisions based on data, as most students were unable to effectively analyze presented graphs.

Overall, these findings highlight the critical need to improve basic knowledge and problem-solving skills in mathematics education. This is in line with previous research from Wakhata et al (2023) that is required the previous knowledge to aid subsequent learning in class.

The Results of The Analysis of Students' Mathematical Literacy Skills on Question 2

The data in Table 4 shows that most of students (78.95%) could not answer question 2 correctly. Some examples of students' work that could not answer correctly can be seen in Figure 4 below.

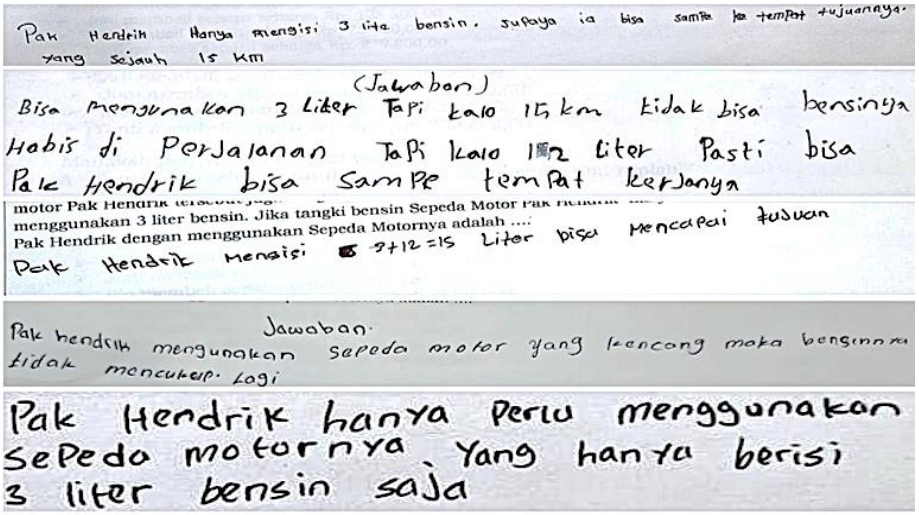


Figure 4. Example of students' incorrect answers to question 2

Based on Figure 4, it appears that they were not able to understand the problem properly so they could not answer the question correctly. This can be seen in the answers given. For example, there are students who answer: “Mr. Hedrik uses a fast motorcycle so there is not enough gasoline anymore”. The answer given is very inconsistent with what is asked in the question. They answered more using their experience that the higher the speed of the motorcycle, the faster the fuel will run out and not enough anymore. Other students gave answers by directly performing the addition operation (12 + 3) from the information given. The answers given showed that they did not read well and did not understand the problem and the information given which made it difficult for them to determine what mathematical concept to use in answering the problem. The results of our interviews with some of the students who could not answer correctly in question 2 showed that; (1) Most of them could not read fluently. They still read by spelling word by word. We suspected that this lack of fluency was one of the factors that caused them not to be able to properly understand the questions given; (2) their learning experience was not used to being given the questions.

On the other hand, there were 21.05% of students who answered question 2 correctly. Some examples of the work of those who answered correctly can be seen in Figure 5 below.

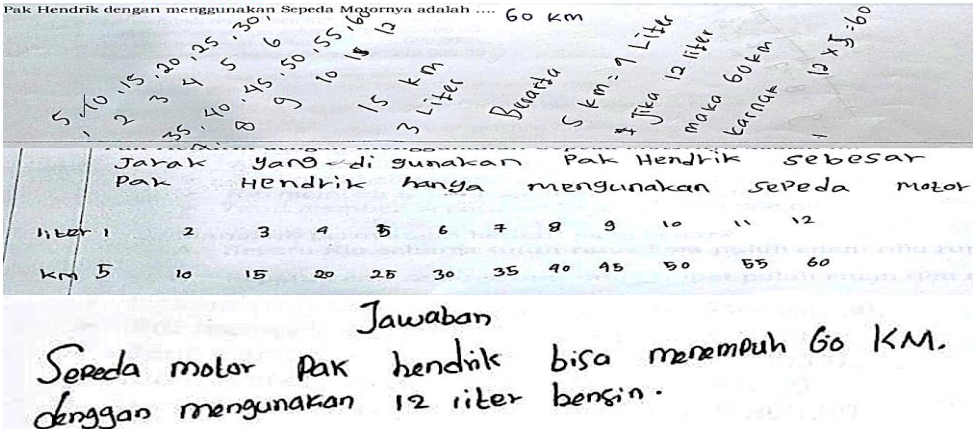


Figure 5. Example of correct student answers to question 2

We interviewed those who answered this question correctly and asked them to explain how they found the answer. Most of them used the method of listing from 1 to 12 and 5 to 60. Based on Figure 5, we can see that they made pairs of numbers starting from 3 and 5; when asked: "why do you start with pairs of 3 and 5?" one of them said: "based on the information in the problem". Based on this answer, we concluded that they understood the problem and were able to analyze the information given. When asked: "why is 10 paired with 50"? the subject said because it is multiplied by 5. The subject further explained: "each of these liters multiplied by 5 results in kilometers". The pairs made (liters, km) were based on a pattern that emerged from the order in which the liters were ordered from 1, 2, 3, 4, ..., 12 and the kilometers were also ordered from 5, 10, 15, ..., 60. Three of the correct answers we interviewed had the same way of answering this question. When we asked: "are there any other events" they all shook their heads indicating that there were no other events that they knew of. The problem can also be solved using the mathematical concept of comparison; 3/15=12/x. The idea of using the concept of comparison to answer the problem had not occurred to them at all. This was reinforced when we asked them: "can you use comparison?" They said "no". We think that in general they could understand the problem and were able to analyze the information and answer correctly, but had difficulty in determining what mathematical concepts to use but were able to interpret the results of the analysis (the patterns that emerged) to predict and make decisions to answer the problem correctly. Overall, the result for question 2 could be seen on Table 6 below.

Table 6. The result for question 2

Sub-Indicator	Result from Test	Result from Interview
1st Indicator: Using mathematics to solve problems in various contexts of daily life		
The ability to choose right mathematical concept according to the problems	- 78.95% students were not able to choose right mathematical concept according to the problems - 21.05% students could determine the right way to solve the problem	- Students couldn't explain mathematical concept using to solve the problem correctly because of several problems including: 1) their inability to read fluently, and 2) they didn't understand the problem properly - Several students could explain properly the right way to solve the

Sub-Indicator	Result from Test	Result from Interview
		problem but they coudn't determine the name of the concept they used to solve the problem
The ability to use various strategies	- Most of the students couldn't determine the right strategy to solve the problem - Several students could determine the right strategy	- Most of the students couldn't explain the right strategy to solve the problem because of misconception on the problem - Several students could explain the right strategy but they couldn't find more than 1 strategy
The ability to find solution of real life-problem by using mathematics	78.95% students couldn't find the solution of the real life problem	- There were only 21.05% of students who answered question 1 correctly - Students' learning experience was not used to being given the real life-questions like question number 2
2nd Indicator: Analyze information displayed in various forms		
The ability to identify information	Most of the students cannot identify information from the question	Students, who couldn't identify information from the question, did not understand the problem contained in the story
The ability to interpretate data	Most of the students couldn't interpretate data from the question	Students couldn't explain their interpretation ondat a because they coudn't identify information from the story
3rd Indicator: Interpret the results of the analysis to predict and make decisions		
The ability to making prediction and decision	- Most of the students couldn't make prediction and decision based on the story - Several students could make prediction and decision based on the story	- Most of the students couldn't explain their prediction and decision based on the story - Using comparison, several students were able to explain their interpretation on results of the analysis (the patterns that emerged) to predict and make decisions to answer the problem correctly

Analysis of students' performance on question 2 revealed that a significant majority (78.95%) struggled to answer correctly due to difficulty in understanding the question and lack of reading fluency. Those who answered correctly (21.05%) demonstrated a better understanding of the question, often using methods such as listing and matching to arrive at an answer, indicating their ability to analyze the information provided. However, many students failed to identify appropriate mathematical concepts and strategies, largely due to their unfamiliarity with real-life application questions. Overall, the results is in line with the research from de Bruin (2023) in which highlight the need for improved reading skills and a stronger focus on the application of mathematical concepts in practical contexts to enhance students' understanding and problem-solving abilities.

The Results of The Analysis of Students' Mathematical Literacy Skills on Question 3

Table 4. shows that the test results of students' mathematical literacy skills on question 3, it can be seen that there are 38.6% of students who cannot answer correctly. Some examples of student work that cannot answer correctly can be seen in Figure 6 below.

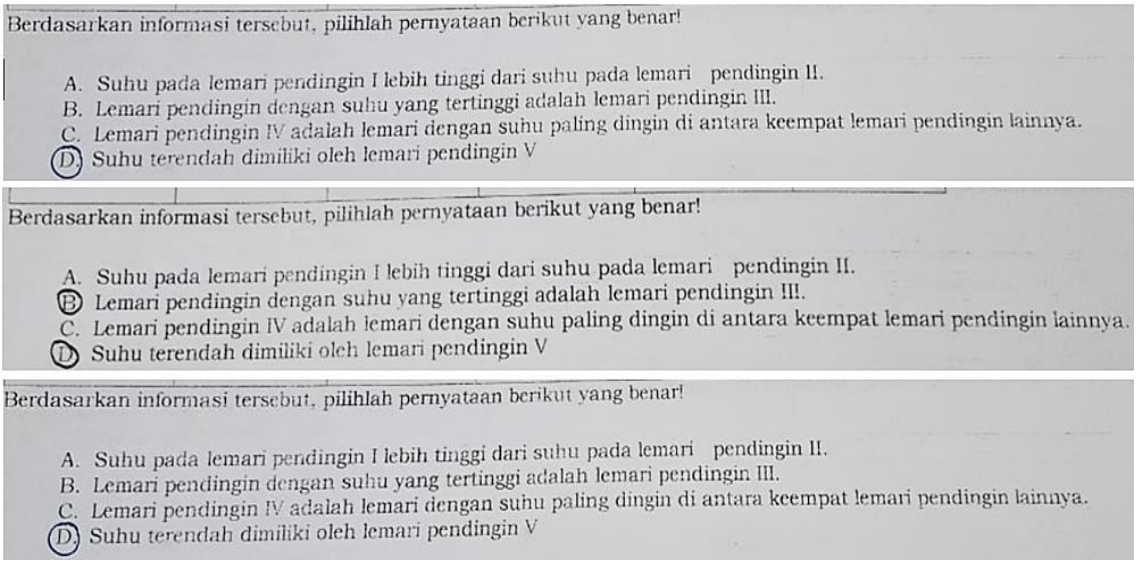
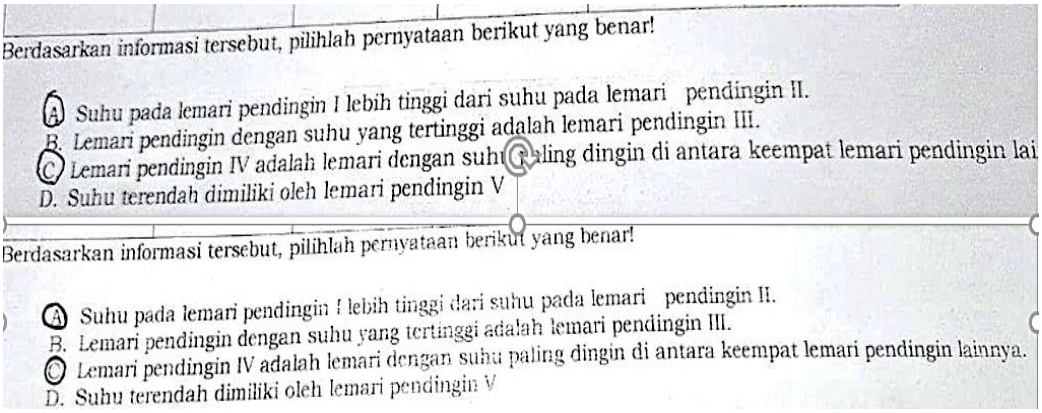


Figure 6. Example of students' incorrect answers to question 3

Based on Figure 6, it appears that the answers given by them are wrong to the questions given. The information provided by question 3 is in the form of table, which requires the ability to read and analyze the information. Their lack of understanding of mathematical concepts related to whole numbers caused them to give wrong answers. This can be seen in the answers given. Many of them could not determine the place value between -2 -5, 0, -9 and -1 which caused them to not be able to answer for statements A, B, C and D. By not giving answers or wrong answers, it shows that they (61.40%) did not understand the problem properly, they were also unable to analyze the information given, so they could not make decisions regarding what mathematical concepts to use in answering the question. The interview results showed that most of them had problems with the concept of whole numbers. They could not determine the numbers on a number line. When we asked: "-2 and -5, which one is greater", most of them said "-5". Likewise -1 and -9, they said that -9 is greater than -1. In their understanding that $5 > 2$, $9 > l$, causes -5 to also be greater than -2 and $-9 > -1$. We also found that most of them did not know that for negative integers, the closer to 0 on a number line, the greater the value. Their lack of learning experience with story problems, inability to analyze the information presented in the form of a table and low understanding of the concept of integers are the reasons why they could not answer question 3 correctly.

In question 3 there were also 61.40% students who answered this question correctly. When conducting interviews related to their understanding of the problem, they illustrated their understanding by making a number line, placing the numbers and explaining the numbers -2 - 5, 0, -9 and -1 on the number line. Based on the explanations

given, we concluded that they were able to understand the problem, able to analyze the information and able to use mathematical concepts to answer the problem correctly. An example of a student's correct answer can be seen in Figure 7 below.


Berdasarkan informasi tersebut, pilihlah pernyataan berikut yang benar!

A. Suhu pada lemari pendingin I lebih tinggi dari suhu pada lemari pendingin II.
B. Lemari pendingin dengan suhu yang tertinggi adalah lemari pendingin III.
C. Lemari pendingin IV adalah lemari dengan suhu paling dingin di antara keempat lemari pendingin lai
D. Suhu terendah dimiliki oleh lemari pendingin V

Berdasarkan informasi tersebut, pilihlah pernyataan berikut yang benar!

A. Suhu pada lemari pendingin I lebih tinggi dari suhu pada lemari pendingin II.
B. Lemari pendingin dengan suhu yang tertinggi adalah lemari pendingin III.
C. Lemari pendingin IV adalah lemari dengan suhu paling dingin di antara keempat lemari pendingin lainnya.
D. Suhu terendah dimiliki oleh lemari pendingin V

Figure 7. Example of correct student answers for question 3

Overall, the result for question 3 could be seen on Table 7 below.

Table 7. The result for question 3

Sub-Indicator	Result from Test	Result from Interview
1st Indicator: Using mathematics to solve problems in various contexts of daily life		
The ability to choose right mathematical concept according to the problems	- 61.40% students could determine the right mathematical concept to solve the problem	- 61.40% students explained that they use whole number concept to solve the problem.
The ability to use various strategies	- The most of students used number line for helping them solve the problem - Several students couldn't use this strategy correctly	- The most of students explained that they used number line for helping them solve the problem - Several students explained that they used number line to solve problem but they coudn't use this strategy properly
The ability to find solution of real life-problem by using mathematics	38.60% students couldn't find the solution of the this real life problem	Students, who couldn't find the solution of the this real life problem, didn't know that for negative integers, the closer to 0 on a number line, the greater the value
2nd Indicator: Analyze information displayed in various forms		
The ability to identify information	- Most of the students could identify information from the question - 38.60% students couldn't determine the mathematical concept that can be used to solve problem	- Students could explained easily the information they got in table - 38.60% students unabled to analyze the information given, so they could not make decisions regarding what mathematical concepts to use in answering the question.

Sub-Indicator	Result from Test	Result from Interview
The ability to interpretate data	Most of the students could interpretate data from the question	Most of the students could explain their interpretation on data based on their knowledge about number line
3rd Indicator: Interpret the results of the analysis to predict and make decisions		
The ability to making prediction and decision	- Most of the students could choose the right answer - Several students couldn't make right prediction and decision to find the answers	- Most of the students could explain their taught and find the right answer - Several students couldn't make right prediction and decicion because of the lack of understanding of mathematical concepts related to whole numbers

The results for question 3 showed that 38.6% of students had difficulty providing the correct answer, mainly due to a lack of understanding of the concept of integers and their ability to analyze the information presented in the table. Many students were unable to identify the correct place value on the number line, leading to misunderstandings about negative integers. In contrast, 61.40% of students demonstrated a strong understanding of the problem by effectively using the number line to analyze and explain their answers. Overall, these findings highlight the need for improved instruction in mathematical concepts related to integers and better analytical skills to improve students' performance in problem solving. As Ridwan et al (2021) said, students, problem solving skills are determined by student analytical skills like the ability in determine conclusions based on premises, determine alternative solutions in decision making, and critical together with creative thinking.

The Results of The Analysis of Students' Mathematical Literacy Skills on Question 4

The 4th problem form is a multiple correct answer problem with an integer domain. Table 4 shows that 66.67% of students answered incorrectly. Some examples of students' work who answered incorrectly can be seen in Figure 8 below.

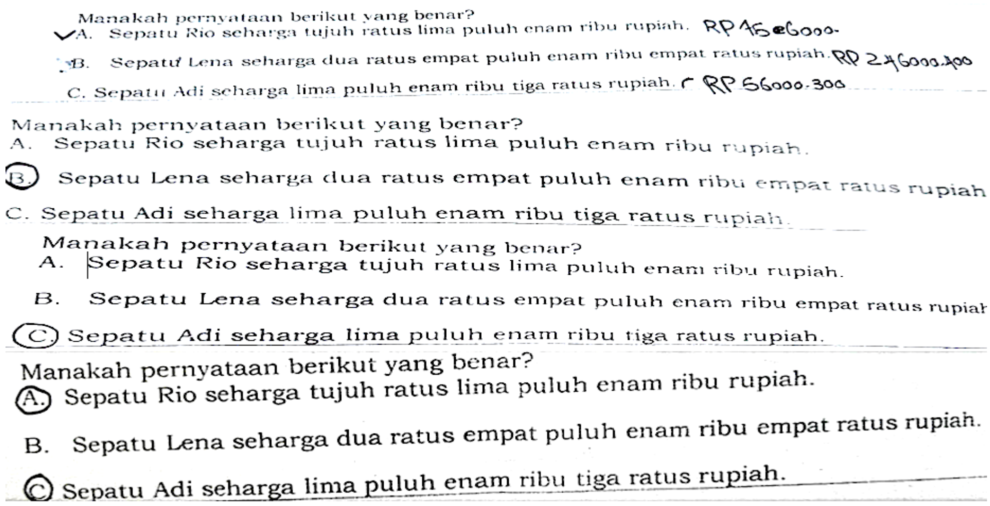


Figure 7. Example of students' incorrect answers to question 4

The most common error made was to state that statement A was true. They were not careful in seeing the relationship between a statement written in the form of a symbol and written in the form of words. Another mistake made was stating that statement B was true only, even though statement C was also true. We suspect that this error is because they did not analyze the information so they were wrong in seeing the relationship between the information and the statement given. This is consistent with what we found when conducting interviews. Most of them stated that they made mistakes in making decisions due to not carefully looking at the information with the statements given. In addition, there were 33.33% who answered this 4th question correctly. They chose the correct statements B and C. The interview results showed that they were able to analyze the information given and correctly make decisions to answer the question. Overall, the result for question 3 could be seen on Table 8 below.

Table 8. The result for question 3

Sub-Indicator	Result from Test	Result from Interview
1st Indicator: Using mathematics to solve problems in various contexts of daily life		
The ability to choose right mathematical concept according to the problems	- 33.33% students could determine the right mathematical concept to solve the problem	- 33.33% students could explained the concept they use to solve the problem
The ability to use various strategies	- The most of students could use the right strategy to solve the problem - Several students couldn't use the solving strategy correctly	- The most of students could explained the use unit value concept to solve the problem - Several students couldn't explain how to use unit value concept to solve this problem
The ability to find solution of real life-problem by using mathematics	66.67% students couldn't find the solution of the this real life problem	66.67% students, who couldn't find the solution of the this real life problem, didn't carefully look at the information with the statements given.
2nd Indicator: Analyze information displayed in various forms		
The ability to identify information	The most of students could identify information from the question	The most of students could explained easily the information they got in the question
The ability to interpretate data	The most of students could interpretate data from the question	The most of students could explain their interpretation on data
3rd Indicator: Interpret the results of the analysis to predict and make decisions		
The ability to making prediction and decision	Although students could understand the information on data but 66.67% of them failed in decide the correct answers based on unit value concept	66.67% students failed to explain the correct answers based on unit value concept

In conclusion, although 33.33% of students answered question 4 correctly, a significant percentage made errors due to misunderstanding the statements involved. The

most common error was related to the failure to analyze the relationship between symbolic and verbal representations. Interviews revealed that students often overlooked important information, leading to incorrect decisions. In contrast, the 33.33% who answered correctly demonstrated effective analytical skills and a better understanding of the mathematical concepts needed to solve the problem. Recent research suggests that improving students' critical thinking and analytical skills through targeted interventions can significantly improve their problem-solving abilities in mathematics (Syafril et al. 2020).

Students' Mathematical Literacy Skills in Solving Minimum Competency Assessment-Based Questions

Based on the results of the analysis, in general, the mathematical literacy skills of students in border schools based on the indicators of literacy skills can be seen in Table 9 below.

Table 9. Mathematical literacy skills of students in border schools

Indicator of Mathematical Literacy	Description
Use math to solve problems with a wide variety of daily life contexts	Not all students have a good understanding of basic mathematical concepts such as cartesian diagrams, comparison, integers used in answering this problem. During the interviews, we found that they had good mathematical skills, but because of the lack of learning experience of contextual problems or story problems, they could not correctly solve these problems. We concluded that they answered incorrectly not because they were not capable, but because of the lack of learning experience in solving or working on similar problems. There are students who use more logic or reasoning in answering the questions given even though the logic built is not through a previous analysis process. The basic ability is there, it is just a matter of how the ability is developed through the learning experience.
Analyze information displayed in various forms (graphs, tables, sections, diagrams and so on)	There are students who are able to analyze the information provided, but most of them have not been able to do so. We obtained this from the analysis of answers and interviews. The lack of ability to analyze information and build relationships between information and statements is the main factor for most of them not being able to understand the given problem which causes them not to be able to answer correctly.
Interpret the results of the analysis to make predictions and decisions	Some students were able to see an emergent regularity to make predictions and decisions. We found this in their answers regarding the relationship between liters and kilometers. Although the argumentation given was reasonable, it was not analyzed beforehand.

The findings in Tabel 9 shows that not all students have a good understanding of basic mathematical concepts such as cartesian diagrams, comparison, integers used in answering this problem. In fact, a strong understanding of mathematics will help students in solving the given problem (Shoaib, Fitzpatrick, and Pitt 2023). One way to build a strong mathematical understanding is to design learning that is tailored to their daily experiences, for example using a visual manipulative approach that involves local wisdom so as to create active, creative, effective and fun learning (Laurens 2018; Nurannisa F. A, Asfar, and Asfar 2020). Another finding that we obtained the lack of learning experience in solving story problems. As the line with research result from Paolucci et al (2024), and from Jupri and Drijvers (2016), students' lack of learning experience with varied problems makes it difficult for them to work correctly when given new problems. They answer was wrong not because they are unable, but because of the lack of learning experience in solving or working on similar problems. To handle this problem, teachers need to familiarize students to work on story problems and make innovations in learning to motivate students to be actively and directly involved so that they can improve students' mathematical literacy skills. Therefore, teachers must innovate more in designing learning that can increase students' motivation and interest in learning.

Another finding in this study is that some students prefer to use logic or reasoning in answering the questions given even though the logic that is built does not go through a previous analysis process. Mathematics requires logic, and logic is important to use to solve problems (Almuhur and Al-Labadi 2021). As the result of previous research from Leton, Wahyudin, and Darhim (2019), not all problems can be solved using mathematical formulas.We found that the basic ability exists, it is just how the ability is developed through the learning experience. There are students who are able to analyze the information given, but most of them have not been able to do so. We found this from analyzing the answers and interviews. The lack of ability to analyze information and build relationships between information and statements is the main factor for most students not being able to understand the problems given which causes them not to be able to answer correctly. In addition, by using the logic of thinking, some of them were able to see an emerging regularity to predict and make decisions. We found this in the answers given regarding the relationship between liters and kilometers. Although the argumentation given was reasonable, it was not analyzed beforehand. One of the alternatives we offer to improve the mathematical literacy skills and learning interests of students in border schools is to design local wisdom-based learning that we call local wisdom literacy. Local wisdom contains mathematical ideas, thoughts, and practices that develop in a particular culture (Fouze and Amit 2018). Through local wisdom, mathematical ideas contained in the culture are absorbed into mathematics learning in schools (Cai et al. 2014; d'Entremont 2015). This local wisdom literacy needs to be integrated with technology to makes learning more meaningful and improve math literacy skills (Hadianto et al. 2022; Persichitte, Suparman, and Spector 2016). The elaboration between local wisdom and technology is expected to be an alternative solution to help students better understand mathematical concepts so that their mathematical literacy skills can improve significantly.

▪ CONCLUSION

This study aims to determine the mathematical literacy skills of junior high school students in border schools in solving problems based on the Minimum Competency Assessment. The results of the study indicate that students experience difficulties in several aspects of mathematical literacy. The main findings indicate that students have limited understanding of basic mathematical concepts, such as Cartesian diagrams, ratios, and integers. In addition, many students have difficulty reading and understanding problems effectively, especially those presented in graphic or narrative formats. Analyzing information from various forms and relating it to the problem posed also proves challenging for students. Furthermore, they often have difficulty selecting and applying the right mathematical concepts needed to solve contextual problems, as well as making the right decisions based on their analysis. Several factors contribute to these challenges, including lack of experience with word problems and contextual problems, which negatively impact students' mathematical literacy. Poor reading skills can further hinder their understanding of problems. Weak basic knowledge of basic mathematical concepts is another significant obstacle. To address these issues, recommendations include strengthening students' understanding of basic mathematical concepts, providing diverse learning experiences, and improving general literacy skills, such as reading comprehension. In addition, it is important to connect math problems to students' everyday lives to increase relevance and motivation. Technology integration can also support math learning and increase student engagement. Through collaborative efforts between teachers, students, and schools, there is hope for significant improvements in students' mathematical literacy skills in border schools.

This study has several limitations. First, this study only involved grade VII students from one school. Therefore, the results of this study may not be generalizable to all students in South Central Timor or Indonesia. Second, this study only focused on students' mathematical literacy skills in solving Minimum Competency Assessments-based questions. Future research can expand the scope of the study by covering other aspects of students' mathematical literacy, such as mathematical communication skills and more complex problem solving.

This study also has implications for further research. First, this study can be repeated involving a larger and more diverse sample to ensure that the results of the study can be generalized. Second, this study can be combined with other research methods, such as classroom observation or in-depth interviews, to gain a more complete understanding of the factors that influence students' mathematical literacy skills. Third, this study can focus on developing effective learning interventions to overcome students' difficulties in understanding basic mathematical concepts and applying them in problem solving.

Overall, this study makes an important contribution to understanding the challenges faced by students in learning mathematics in South Central Timor. The findings of this study can be used by teachers, educators, and policy makers to improve the quality of mathematics education in the area.

▪ REFERENCES

Aisyah, A., & Juandi, D. (2022). The description of Indonesian student mathematics literacy in the last decade. International Journal of Trends in Mathematics Education Research, 5(1), 105-110.

Almuhur, E., & Al-Labadi, M. (2022). The emergence of logic in mathematics and its influence on learners' cognition and way of thinking. International Journal of Nonlinear Analysis and Applications, 13(1), 1151-1160.

Asfar, A. M. I. T., & Asfar, A. M. I. A. (2020). Learning design based on local wisdom maddawa-dawa, mammanu-manu and mappettuada. JTAM (Jurnal Teori dan Aplikasi Matematika), 4(2), 214-223.

Bilad, M. R., Zubaidah, S., & Prayogi, S. (2024). Addressing the PISA 2022 Results: A Call for Reinvigorating Indonesia's Education System. International Journal of Essential Competencies in Education, 3(1), 1-12.

Cai, J., Cirillo, M., Pelesko, J., Bommero Ferri, R., Borba, M., Geiger, V., ... & Kaiser, G. (2014). Mathematical modeling in school education: Mathematical, cognitive, curricular, instructional and teacher educational perspectives. In Proceedings of the 38th Conference of the International Group for the Psychology of Mathematics Education and the 36th Conference of the North American Chapter of the Psychology of Mathematics Education (pp. 145-172). Springer.

Creswell, J. W., & Poth, C. N. (2016). Qualitative inquiry and research design: Choosing among five approaches. Sage publications.

De Bruin, K., Kestel, E., Francis, M., Forgasz, H., & Fries, R. (2023). Supporting students significantly behind in literacy and numeracy: a review of evidence-based approaches. Australian Education Research Organisation.

d'Entremont, Y. (2015). Linking mathematics, culture and community. Procedia-Social and Behavioral Sciences, 174, 2818-2824.

Ekawati, R., Susanti, S., & Chen, J. C. (2020). Primary students'mathematical literacy: a case study. Infinity Journal, 9(1), 49-58.

Fatwana, H., Azhari, B., & Elsayed, S. A. M. (2024). Construct self-efficacy to combat math anxiety: A systematic review. Journal of Educational Technology, Science and Mathematics, 1(1), 1-17.

Fenanlampir, A., Batlolona, J. R., & Imelda, I. (2019). The struggle of Indonesian students in the context of TIMSS and PISA has not ended. International journal of civil engineering and technology, 10(2), 393-406.

Fouze, A. Q., & Amit, M. (2017). On the importance of an ethnomathematical curriculum in mathematics education. Eurasia Journal of Mathematics, Science and Technology Education, 14(2), 561-567.

Genlott, A. A., & Grönlund, Å. (2016). Closing the gaps–Improving literacy and mathematics by ict-enhanced collaboration. Computers & Education, 99, 68-80.

Goczek, Ł., Witkowska, E., & Witkowski, B. (2021). How does education quality affect economic growth?. Sustainability, 13(11), 6437.

Guerrero, G., & Sjöström, J. (2024). Critical scientific and environmental literacies: a systematic and critical review. Studies in Science Education, 1-47.

Hadianto, D., S. Damaianti, V., Mulyati, Y., & Sastromiharjo, A. (2022). Effectiveness of literacy teaching design integrating local culture discourse and activities to enhance reading skills. Cogent Education, 9(1), 2016040.

Hamdu, G., Hadiana, D., Sylvia, N., Apipatunnisa, I., & Yulianto, A. (2023). Measuring Changes of Students' Conceptual Understanding of Literacy and Numeracy in Natural Science by Using Rasch Model. Jurnal Ilmiah Sekolah Dasar, 7(3).

Jewarut, S., & Lidya, M. L. S. (2022). Studi Pemahaman Literasi Digital Serta Efek Domino Perkembangan Soft Skills Siswa Daerah Perbatasan. EDUKASIA: Jurnal Pendidikan dan Pembelajaran, 3(3), 505-512.

Jupri, A., & Drijvers, P. (2016). Student difficulties in mathematizing word problems in algebra. Eurasia Journal of Mathematics, Science and Technology Education, 12(9), 2481-2502.

Komarudin, K., Suherman, S., & Vidákovich, T. (2024). The RMS teaching model with brainstorming technique and student digital literacy as predictors of mathematical literacy. Heliyon, 10(13).

Kontaş, H., & Özcan, B. (2022). Explaining middle school students' mathematical literacy with sources of self-efficacy, achievement expectation from family, peers and teachers. International Journal of Education and Literacy Studies, 10(1), 198-206.

Laurens, T. (2018, February). The effectiveness of local wisdom based-realistic mathematics learning to improve learners' characters at state elementary schools in ambon city. In First Indonesian Communication Forum of Teacher Training and Education Faculty Leaders International Conference on Education 2017 (ICE 2017) (pp. 611-615). Atlantis Press.

Lagria, H., & Pañares, N. (2023). Difficulties in Solving Mathematical Problems and Pupils' Performance. International Journal of Research Publications, 129(1).

Lee, Y., Capraro, R. M., Capraro, M. M., & Bicer, A. (2023). School and student factors and their influence on affective mathematics engagement. Journal of Ethnic and Cultural Studies, 10(1), 45-61.

Leton, S. I. (2019, November). Mathematical connection ability of deaf student in completing social arithmetic tests. In Journal of Physics: Conference Series (Vol. 1280, No. 4, p. 042012). IOP Publishing.

Machromah, I. U., Sutama, S., Prayitno, H. J., Faiziyah, N., & Fatmasari, L. W. S. (2020). Designing PISA-like mathematics task to assess students' mathematical literacy. Universal Journal of Educational Research, 8(10), 4986-4995.

Mahanal, S., Zubaidah, S., Sumiati, I. D., Sari, T. M., & Ismirawati, N. (2019). RICOSRE: A Learning Model to Develop Critical Thinking Skills for Students with Different Academic Abilities. International Journal of Instruction, 12(2), 417-434.

Muhaimin, L. H., Sholikhakh, R. A., Yulianti, S., Hendriyanto, A., & Sahara, S. (2024). Unlocking the secrets of students' mathematical literacy to solve mathematical problems: A systematic literature review. EURASIA Journal of Mathematics, Science and Technology Education, 20(4), em2428.

Organisation for Economic Co-operation and Development (OECD). 2023. PISA 2022 Results Factsheets Indonesia.

Paolucci, C., Vancini, S., Bex II, R. T., Cavanaugh, C., Salama, C., & de Araujo, Z. (2024). A review of learning analytics opportunities and challenges for K-12 education. Heliyon.

Persichitte, K. A., Suparman, A., & Spector, M. (2016). Educational technology to improve quality and access on a global scale. In Educational Technology World Conference (ETWC 2016) Editors: Persichitte, Kay, Suparman, Atwi, Spector, Michael (Eds.).

Purnomo, S., Rahayu, Y. S., & Agustini, R. (2023). Effectiveness of adi-stem to improve student's science literacy skill. IJORER: International Journal of Recent Educational Research, 4(5), 632-647.

Rahmania, Ghifrani, U., Safitri, R. Rochmi., Putri, A. F., Nurohman, S., & Salehudin. A. 2024. "Systematic Literature Review: How Important Are Literacy and Numeracy for Students, and How to Improve It?" Indonesian Journal of Educational Research and Review 7:416–29. doi: 10.23887/ijerr.v7i2.79797.

Rahmawati, D. N., Purnomo, T., & Kuntjoro, S. (2022). Profile of SETS Approach to Improve Student's Critical Thinking Skills During 2015 to 2022. IJORER: International Journal of Recent Educational Research, 3(3), 340-353.

Ridwan, M. R., Retnawati, H., & Hadi, S. (2021). The effectiveness of innovative learning on mathematical problem-solving ability: A Meta-Analysis. International Journal of Research in Education and Science, 7(3), 910-932.

Rizki, L. M., & Priatna, N. (2019, February). Mathematical literacy as the 21st century skill. In Journal of Physics: Conference Series (Vol. 1157, No. 4, p. 042088). IOP Publishing.

Sachdeva, S., & Eggen, P. O. (2021). Learners' critical thinking about learning mathematics. International Electronic Journal of Mathematics Education, 16(3), em0644.

Shoaib, M., Fitzpatrick, D., & Pitt, I. (2023). Assistive technology-based solutions in learning mathematics for visually-impaired people: exploring issues, challenges and opportunities. Multimedia Tools and Applications, 82(29), 46153-46184.

Sjøberg, S., & Jenkins, E. (2022). PISA: a political project and a research agenda. Studies in Science Education, 58(1), 1-14.

Stevenson, K. T., Carrier, S. J., & Peterson, M. N. (2014). Evaluating strategies for inclusion of environmental literacy in the elementary school classroom. The Electronic Journal for Research in Science & Mathematics Education, 18(8).

Suárez Brito, P., Baena Rojas, J. J., López Caudana, E. O., & Glasserman Morales, L. D. (2022). Academic literacy as a component of complex thinking in higher education: a scoping review.

Syafril, S., Aini, N. R., Pahrudin, A., & Yaumas, N. E. (2020, February). Spirit of mathematics critical thinking skills (CTS). In Journal of Physics: Conference Series (Vol. 1467, No. 1, p. 012069). IOP Publishing.

Syamsuri, A. S., & Bancong, H. (2022). Do gender and regional differences affect students' reading literacy? a case study in Indonesia. Eurasian Journal of Applied Linguistics, 8(1), 97-110.

Thanheiser, E., & Mamolo, A. (2024). Introduction to the virtual special issue: Mathematics that underpins social issues. The Journal of Mathematical Behavior, 75, 101176.

Umar, U., & Widodo, A. (2022). *Analisis faktor penyebab rendahnya kemampuan akademik siswa sekolah dasar di daerah pinggiran.* Jurnal Educatio FKIP UNMA, 8(2), 458-465.

Wakhata, R., Balimuttajjo, S., & Mutarutinya, V. (2023). Building on Students' Prior Mathematical Thinking: Exploring Students' Reasoning Interpretation of Preconceptions in Learning Mathematics. Mathematics Teaching Research Journal, 15(1), 127-151.

Wahyudi, A., Farhani, A., & Janssen, M. (2018). Relating big data and data quality in financial service organizations. In Challenges and Opportunities in the Digital Era: 17th IFIP WG 6.11 Conference on e-Business, e-Services, and e-Society, I3E 2018, Kuwait City, Kuwait, October 30–November 1, 2018, Proceedings 17 (pp. 504-519). Springer International Publishing.

Widianti, W., & Hidayati, N. (2021). *Analisis kemampuan literasi matematis siswa smp pada materi segitiga dan segiempat.* JPMI (Jurnal Pembelajaran Matematika Inovatif), 4(1), 27-38.

Yudiana, K., Putri, N. N. C. A., & Antara, I. G. W. S. (2023). *Kesenjangan kemampuan literasi siswa sekolah dasar di daerah perkotaan, pinggiran kota, dan pedesaan.* Jurnal Penelitian dan Pengembangan Pendidikan, 7(3).

Zulkardi, Z., & Kohar, A. W. (2018). Designing PISA-like mathematics tasks in Indonesia: Experiences and challenges. In Journal of Physics: Conference Series (Vol. 947, No. 1, p. 012015). IOP Publishing.