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MATHEMATICAL LITERACY SKILLS BY USING REALISTIC MATHEMATICS EDUCATION-BASED WORKSHEETS

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Abstract

This research aims to measure students' mathematical literacy skills after using e-worksheets based on the Realistic Mathematics Education (RME) Approach. This research uses a descriptive qualitative approach. Students in class VIII of SMP N 1 Talang Kelapa, each with low, medium, and high literacy skills, were the subjects of this research. The categorization of students is based on the number of mathematical literacy components resulting from student answers on the test. Data was collected through observation, tests, and interviews. The purpose of observation is to measure the implementation of learning through RME, and the test is to measure students' literacy skills. In data analysis, the elements that appear most frequently are communication, mathematization, and the use of symbolic, formal, and technical language operations. Component 1 appears when students write a statement containing information about a problem and representing the results obtained. Component 2 emerges when students create a mathematical model of the problem, and component 7 emerges when students use formal forms that conform to mathematical definitions and rules. The results of learning observations carried out using e-worksheets based on the RME approach show that learning can be said to be of good quality according to the established criteria.

Keywords: mathematical literacy skills, e-worksheet, realistic mathematics education

Abstrak

Tujuan penelitian ini adalah untuk mengukur kemampuan literasi matematika siswa setelah menggunakan e-worksheet berbasis Pendekatan Realistic Mathematics Education (RME). Penelitian ini menggunakan pendekatan deskriptif kualitatif. Siswa di kelas VIII SMP N 1 Talang Kelapa, masing-masing berkemampuan literasi rendah, sedang, dan tinggi, adalah subjek penelitian ini. Pengkategorian siswa berdasarkan jumlah komponen literasi matematika yang dihasilkan dari jawaban siswa pada tes. Data dikumpulkan melalui observasi, tes, dan wawancara. Tujuan observasi adalah untuk mengukur keterlaksanaan pembelajaran melalui RME, dan tes adalah untuk mengukur kemampuan literasi siswa. Dalam analisis data, elemen yang paling sering muncul adalah komunikasi, matematisasi, dan penggunaan simbolik, formal, dan teknis operasi bahasa. Komponen 1 muncul ketika siswa menulis pernyataan yang berisi informasi tentang suatu masalah dan mewakili hasil yang diperoleh. Komponen 2 muncul saat siswa membuat model matematika dari masalah, dan komponen 7 muncul ketika siswa menggunakan bentuk formal yang sesuai dengan definisi dan aturan matematika. Hasil dari observasi pembelajaran yang dilakukan dengan e-worksheet berbasis pendekatan RME menunjukkan bahwa pembelajaran dapat dikatakan berkualitas baik sesuai dengan kriteria yang telah ditetapkan.

Kata kunci: kemampuan literasi matematika, e-worksheet, pendekatan pendidikan matematika realistik

INTRODUCTION

Mathematics can be said to be the science that underlies the development of science and technology (Rahayu & Kusuma, 2019). Mastery of mathematics subjects in schools is needed to improve students' calculation, reasoning, and analytical abilities in solving a problem (Masjaya & Wardono, 2018). To improve the quality of education in Indonesia, the Ministry of Education and Culture implements the Freedom Curriculum. This program is

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designed to provide freedom to learn creatively, independently, and conceptually in the development of cognitive abilities in the form of mathematical literacy (Naufal & Amalia, 2022).

According to Stacey & Turner in (Astuti, 2018) "mathematical literacy" is a skill that uses mathematical thinking when solving an everyday problem in the hope of being able to get through life's challenges. Mathematical literacy is related to the skills to apply mathematics in real life because the process of solving real problems is usually found in everyday life and becomes an important part of mathematical literacy (Astuti, 2018).

According to Hanifah in (Setiawati et al., 2020) literacy is the most important part of education because students who do not carry out literacy activities to the maximum have less learning experience than students who carry out literacy activities to the fullest. Organization of Economic Co-operation and Development in 2009 in (Masjaya & Wardono, 2018) explained that the importance of mathematical literacy is due to the skills of students who are prioritized in this area, namely the skills to analyze it, give reasons, and then convey ideas well in the various mathematical problems they face, which is what bridges real situations with the mathematics that has been studied in class.

However, the lack of interest in reading causes them to have difficulty applying the knowledge they have. The policy brief (Pratiwi et al., 2020) states that the scores of students who read only when assigned by the teacher in PISA 2018 are 30-65 points lower than those of students who like to read. This is in accordance with the results of the Program for International Student Assessment (PISA) 2018w, here student achievement in Indonesia was only ranked 69 out of 79 countries, with an average reading skills of 42 points, a mathematics skills of 52 points, and a science skills of 37 points (Pratiwi et al., 2020).

The teacher's unfamiliarity with giving problems related to contextual problems can also contribute to students' low mathematical literacy (Astuti, 2018). It is important for students to be able to experience the problem-solving process themselves in a variety of different situations in order to be able to use their skills properly. According to (Sohilait, 2021) the relationship between mathematical concepts and everyday experience should be emphasized in learning. One suitable approach is the RME approach. This is in accordance with (Hapipi, 2011) which states that RME is based on a conceptual basis that views mathematics and its learning as activities that must be related to reality and must also be

related to students' daily experiences which states that RME is based on a conceptual basis that views mathematics and its learning as activities that must be related to reality and must also be related to students' daily experiences.

The quality of material presentation that is not appropriate with the traditional learning process is a factor in students' lack of literacy skills in Indonesia; as a result, student achievement and willingness to learn are low, so different types of teaching materials are needed that are different from thematic books and textbooks in order to meet the goals and prevailing curriculum expectations and can also encourage learning motivation in students (Anisa Asnawati et al., 2021). Teaching materials that can be used are one of them, and worksheet teaching materials are one of them. Worksheets, or in Indonesian, Student Worksheets (LKPD), are student assignment sheets that must be done (Prabawati et al., 2019). In this digital era, teaching materials must be in line with this rapidly developing technology so that the appearance of worksheets becomes more attractive so students don't get bored easily and are interested in learning. Worksheets can be made into e-worksheets with a book-like appearance by using the flipbook application (Sugianto et al., 2017). According to Mirnawati et al. (2022), the use of online-based flipbook media can improve literacy and student learning activities.

When mathematics is taught as an exact science, students will be instilled with the concept of rules and formulas that must be applied to problems, but many of them have difficulty applying this knowledge because it requires subject matter to help them overcome their difficulties. The material for linear equations in two variables is one of the materials that can be used. This statement is in line with research (Nurhayati et al., 2021) which shows the difficulties experienced by students when trying to work on problems, especially on indicators of the skills to apply or use procedures to model and specify variable values in linear equations in two variables material. In addition, the selection of this linear equations in two variables material was based on the consideration that, according to Mirnawati et al. (2022) the linear equations in two variables material has many relationships with everyday life. It provides opportunities for the mathematization process to occur, where the process of mathematization is an important part of mathematical literacy skills (Chasanah, 2021).

Several previous studies on literacy skills and realistic mathematics education approaches have been conducted, for example, in research Nolaputra et al. (2018), which

concluded that students' mathematical literacy skills were higher and better than increasing mathematical literacy skills through conventional learning. Then there is another piece of research related to mathematical literacy and a realistic approach to mathematics education, namely research Ayunis & Belia (2021) which finds that students who study with the RME have a greater level of mathematical literacy than students who follow a traditional learning method. No one has previously documented the mathematical literacy skills of students at SMPN 1 Talang Kelapa using e-worksheet teaching materials and a practical approach to mathematics education. Thus, using e-worksheets based on a practical approach to mathematics education, the research aims to characterize students' mathematical literacy skills.

METHODS

Descriptive research with a qualitative approach is the method used in this study, with the aim of describing the mathematical literacy skills of 8th graders at SMPN 1 Talang Kelapa Palembang with the use of e-worksheets based on RME. The subject of this research are three students who were categorized as students with high, medium, and low mathematical literacy skills. The components and indicators of students' mathematical literacy skills used in this study are according to OECD (2019) as follows.

Table 1. Components and Indicators of Mathematical Literacy Skills

No	Mathematical Literacy Skills Component	Indicator
1	Communication	• Create a statement based on the information you have about a problem. • Summarize and present the results that have been obtained.
2	Mathematization	• Turning real world problems into mathematical models
3	Representation	• Use various kinds of representations in solving problems
4	Reasoning and reasoning	• Give reasons for your statement or solution to a problem.
5	Using strategies in problem solving	• Develop a mathematical plan or strategy in solving a contextual problem
6	Using symbols, languages, techniques, and operations.	• uses formal forms in accordance with mathematical definitions and rules.
7	Using math tools	• Using tools to learn how to them to solve math problem

In this study, only six components were discussed (components 1- 6). Component 7 was not assessed since students did not use mathematical tools in this learning material.

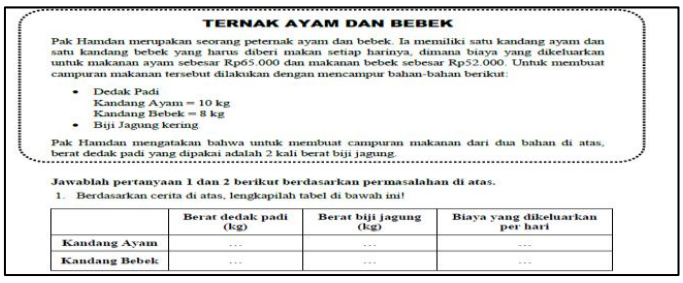
Data collection techniques were carried out using test in the form of mathematical literacy problem from level 1 to level 4, observation sheets, and interviews. Tests aim to see students' mathematical literacy skills, observations aim to see the implementation of learning through RME, interviews aim to strengthen the student answers. Test data will be analyzed by describing the skills of mathematical literacy. Researchers will analyze three student answers grouped into high, moderate, and low mathematical literacy skills. The categorization of student abilities can be seen in the many components of literacy skills that emerge from the students' answers to tests.

RESULTS AND DISCUSSION

Three sessions were held to conduct the research. During the initial meetings, students worked on e-worksheets designed to help them recognize linear equations with two variables and linear equation systems with two variables. Students were also required to create mathematical models of real-world issues including two-variable linear equations. The objective of instruction in the second meeting is for students to be able to use the elimination, substitution, and mixed techniques of linear equations in two variables to solve contextual issues. Students were given four essay tasks at the third meeting to gauge their level of mathematical literacy. Three pupils were selected from this group to symbolize pupils with high, moderate, and low levels of mathematics literacy.

Analysis of student answers of problem 1

Problem 1 is the lowest level of mathematical literacy as can be seen in Figure 1.



TERNAK AYAM DAN BEBEK

Pak Hamdan merupakan seorang peternak ayam dan bebek. Ia memiliki satu kandang ayam dan satu kandang bebek yang harus diberi makan setiap harinya, dimana biaya yang dikeluarkan untuk makanan ayam sebesar Rp65.000 dan makanan bebek sebesar Rp52.000. Untuk membuat campuran makanan tersebut dilakukan dengan mencampur bahan-bahan berikut:

- Dedak Padi
  Kandang Ayam = 10 kg
  Kandang Bebek = 8 kg
- Biji Jagung kering

Pak Hamdan mengatakan bahwa untuk membuat campuran makanan dari dua bahan di atas, berat dedak padi yang dipakai adalah 2 kali berat biji jagung.

Jawablah pertanyaan 1 dan 2 berikut berdasarkan permasalahan di atas.

1. Berdasarkan cerita di atas, lengkapilah tabel di bawah ini!

	Berat dedak padi (kg)	Berat biji jagung (kg)	Biaya yang dikeluarkan per hari
Kandang Ayam	...	...	...
Kandang Bebek	...	...	...

Figure 1. Problem of Mathematical Literacy Skills Number 1

The answer to question number 1 TN can be seen in Figure 2.

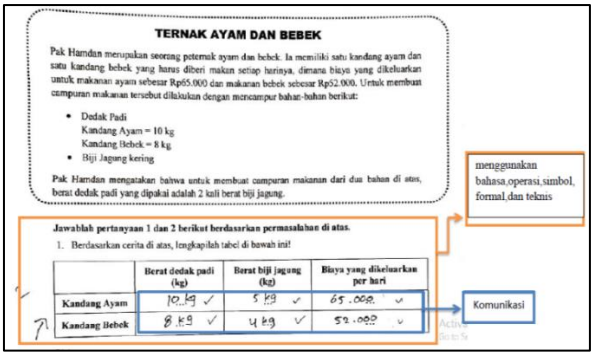


Figure 2. TN's Answers to Question 1

Based on the responses provided, it can be inferred that TN possesses high level mathematics literacy. TN satisfies two requirements for literacy skills in question 1 by resolving issue number 1, specifically component 1. By completing the table and presenting the findings in the supplied table, TN is able to create assertions regarding the data from issue number 1. TN is permitted to employ formal forms in component 6 in accordance with the formulation of mathematical rules.

Based on TN's answer based on the interview findings, TN had a good understanding of the problem's facts and was able to clarify what was known and how to get the total weight of corn kernels needed for sometimes the chickens and sometimes the ducks, and concluded how to solve the problem.

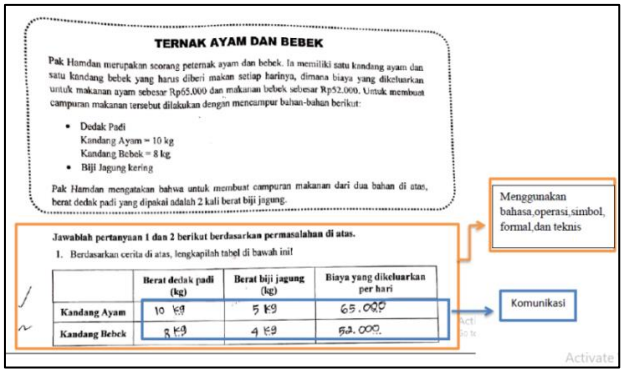


Figure 3. RR's Answer to Question 1

From RR's answers above, RR is categorized as a student with medium-level mathematical literacy skills. When solving problem 1, RR fulfills 2 components of literacy skills, namely, component 1, where RR can write statements about information by filling in tables and presenting their results in the tables that have been provided. In component 6, RR can use formal forms according to the definition of mathematical rules.

According to RR's explanation of the interview results, RR had a good understanding of the information contained in the problem, as he was able to explain what was known and how to get the total weight of corn kernels required for sometimes chickens and sometimes ducks, and he came to a conclusion on how to solve the problem.

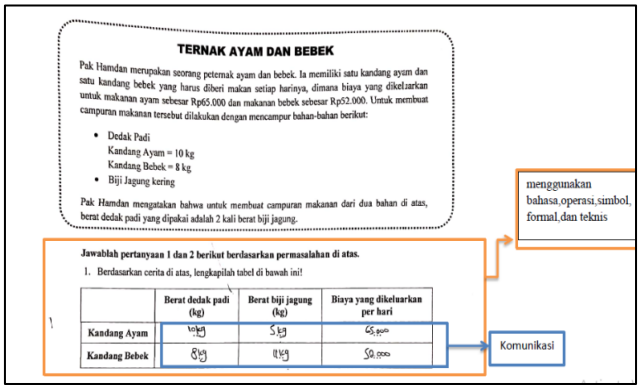


Figure 4. RK's Answers to Question 1

From RK's answers above, RK is categorized as a student with low-level mathematical literacy skills. When solving problem 1, RK fulfills 2 components of literacy skills, namely, component 1, where RK can write statements about information by filling in tables and presenting the results they get in the tables that have been provided. In component 6, RK can use formal forms according to the definition of mathematical rules.

According to RK's explanation of the interview results, even though RK had written down the appropriate answers, during the interview, RK was able to explain the information known, but RK had difficulty explaining where RK got the total for the weight of corn kernels used, and RK also had difficulty deducing how to solve the problem.

Analysis of student answers of problem 2

Students with high and moderate literacy skills fulfill the five components of mathematical literacy skills, while students with low literacy skills fulfill two components of mathematical literacy skills. The following is attached to question 2.

TERNAK AYAM DAN BEBEK

Pak Hamdan merupakan seorang peternak ayam dan bebek. Ia memiliki satu kandang ayam dan satu kandang bebek yang harus diberi makan setiap harinya, dimana biaya yang dikeluarkan untuk makanan ayam sebesar Rp65.000 dan makanan bebek sebesar Rp52.000. Untuk membuat campuran makanan tersebut dilakukan dengan mencampur bahan-bahan berikut:

- Dedak Padi
  Kandang Ayam = 10 kg
  Kandang Bebek = 8 kg
- Biji Jagung kering

Pak Hamdan mengatakan bahwa untuk membuat campuran makanan dari dua bahan di atas, berat dedak padi yang dipakai adalah 2 kali berat biji jagung.

Jawablah pertanyaan 1 dan 2 berikut berdasarkan permasalahan di atas.

1. Berdasarkan cerita di atas, lengkapilah tabel di bawah ini!

	Berat dedak padi (kg)	Berat biji jagung (kg)	Biaya yang dikeluarkan per hari
Kandang Ayam	...	...	...
Kandang Bebek	...	...	...

2. a. Bantulah Pak Hamdan untuk membuat persamaan matematika dari tabel di atas.

b. Pak Hamdan menduga bahwa harga 1 kg dedak padi adalah Rp6000 dan harga 1kg biji jagung adalah Rp1000. Apakah dugaan Pak Hamdan tersebut benar? Jelaskan alasannu

Figure 5. Problem 2 of Mathematical Literacy skills

Answer number 2 TN can be seen in Figure 6

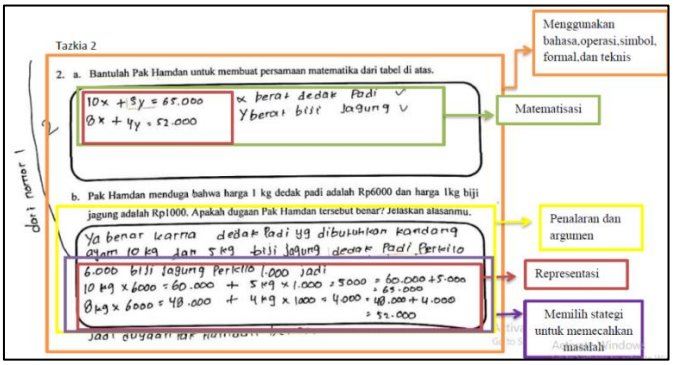


Figure 6. TN's answer to question 2

TN met the first of the five requirements for mathematical literacy abilities (Component 1) while addressing Problem 2; nevertheless, TN faulted when completing the problem's example and failed to make a statement about the knowledge that was known to the question. TN is able to represent real-world issues into a mathematical form in component 2. Students utilize a variety of symbols and numbers in mathematical representations to solve issue number two in component 3, where TN employs a variety of representations. Additionally, TN can offer a convincing defense of the claim or fix for issue number 2 in component 4. Component 5's TN problem can be resolved by selecting a plan of action. Component 6 is the final component to show up. As per the definition of, TN is permitted to utilize a formal form.

As per TN's explanation based on the interview findings, TN had a thorough understanding of the information in the problem and was able to clarify what was known, how he translated real-world problems into a mathematical form, justify his conjectures, and come to a solution.

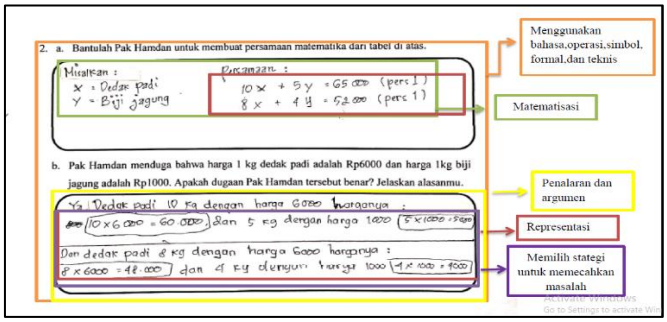


Figure 7. RR's answer to question 2

In solving problem 2, RR also fulfills the five components of literacy skills. In the first component, the RR students failed to write down information from the problems in question and provided incorrect examples. In component 2, RR can model real problems into mathematical forms. In component 3, RR uses various representations to solve problem number 2. In component 4, RR can also provide appropriate justification for statements or solutions to problem number 2. In component 5, RR tries to multiply the respective weights of rice bran and corn kernels by the estimated price to see whether the assumption given is correct. The last component that appears is component 6. RR can use a formal form according to the definition of mathematical rules.

According to RR's explanation of the interview results, RR had understood the information contained in the problem well, where he could explain what was known and how he modeled real-world problems into a mathematical form, explain the conjectures he made, and conclude how to solve the problem.

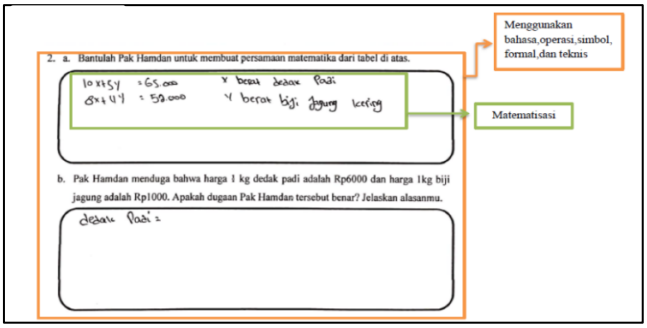


Figure 8. RK's answer to question 2

In solving problem 2, RK only fulfills two components of literacy skills. In component 1, RK did not write down information regarding the weight of rice bran and corn kernels from the problem. In component 2, RK can model real problems into mathematical forms. In component 3, RK does not use various kinds of representations as in problem 2. In component 4, RK has not been able to write arguments or has difficulty doing so. In component 5, RK also has difficulty determining what method or strategy is appropriate. The last component that appears is component 6. RK can use a formal form according to the definition of mathematical rules.

According to RK's explanation of the interview results, even though RK had written down examples and modeled the problem, during the interview RK could not explain how he got it. RK also had difficulty explaining how to prove conjectures and also determining how to solve the problem

Analysis of student answers of problem 3

Students with high and moderate levels of skills fulfill 5 components of mathematical literacy skills, namely components 1, 2, 3, 5, and 6. Then, students with low literacy levels complete only three components of mathematical literacy skills. Question 3 is attached.

SEWA RUKO DAN RUMAH

Tria memiliki banyak rumah dan ruko yang biasanya dia sewakan setiap bulan. Tabel di bawah ini menunjukkan biaya sewa per bulan untuk rumah dan rukonya.

Tempat	Biaya sewa
Rumah	Rp2.000.000/ bulan
Ruko	Rp6.000.000/bulan

3. Jika pada suatu waktu, total dari pendapatan sewa Tria sebesar Rp66.000.000 dengan menyewakan 21 tempat, berapa banyak rumah dan ruko yang disewakan pada bulan itu?

Figure 9. Problem 3 of Mathematical Literacy skills

TN's answer to question 3 is attached in Figure 10.

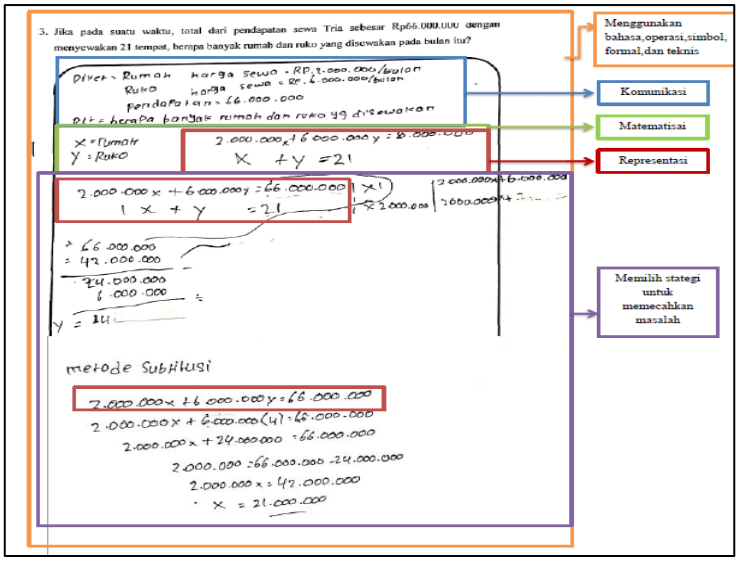


Figure 10. TN's answer to question 3

In solving problem number 3, TN fulfills the five components of mathematical literacy skills. In component 1, TN writes down what information is known and asked in question 3. In component 2, TN can model real problems into mathematical form. In component 3, TN uses various representations in problem 3. In component 4, TN is not yet able to write arguments. In component 5, TN can choose a settlement strategy, but the calculations made by TN are not correct. The last component that appears is component 6. TN can use a formal form according to the definition of mathematical rules.

According to TN's explanation of the interview results, TN had understood the information contained in the problem well, where he could explain what was known and how he modeled real-world problems into a mathematical form, explain his reasons for determining a solving strategy, and conclude how to solve the problem.

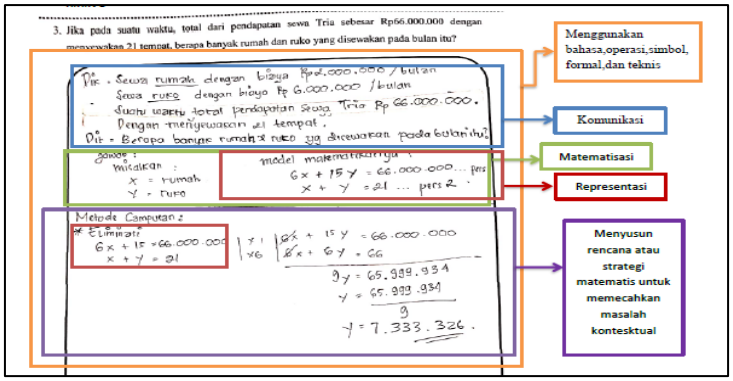


Figure 11. RR student answers to question number 3

In solving problem 3, RR fulfills the five components of mathematical literacy skills. In component 1, RR writes down what information is known and asked in question 3. In component 2, RR models real problems into mathematical forms. In component 3, RR uses various representations for problem 3. In component 4, RR has not been able to write arguments. In component 5, RR can choose a settlement strategy, but RR can only solve it with one method. The last component that appears is component 6. RR can use formal forms according to the definition of mathematical rules.

According to RR's explanation of the interview results, RR had understood the information contained in the problem well, where he could explain what was known and how he modeled real-world problems into a mathematical form, explain his reasons for determining a solving strategy, and conclude how to solve the problem.

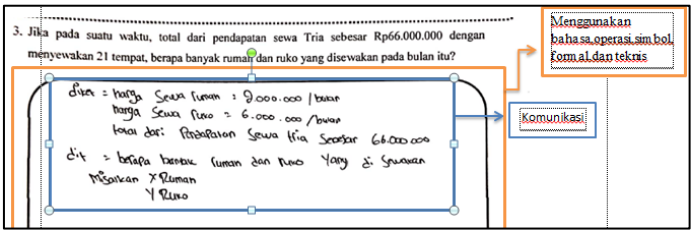


Figure 12. RK students' answers to question number 3

In solving problem 3, RK fulfills only 2 components of mathematical literacy skills. In component 1, RK writes down information from the problems in question. In component 2, RK cannot model real-world problems into mathematical form. In component 3, RK is not able to use various kinds of representations for question 3. In component 4, RK is also not able to write down arguments. In component 5, RK has also not been able to determine a strategy for solving the problem. The last component that appears is component 6. RK can use a formal form according to the definition of mathematical rules.

According to RK's explanation of the interview results, RR was only able to explain what information was contained in the problem; for further completion, RK had difficulties determining the mathematical model and solving the problem.

Analysis of student answers of problem 4

Only TN students who can answer with high mathematical literacy skills can fulfill 3 components, namely components 1, 2, and 6. Then, students with medium literacy skills (RR)

and low level RK did not answer question 4 because they did not meet the component of mathematical literacy skills in question 4. The following is attached to question number 4.

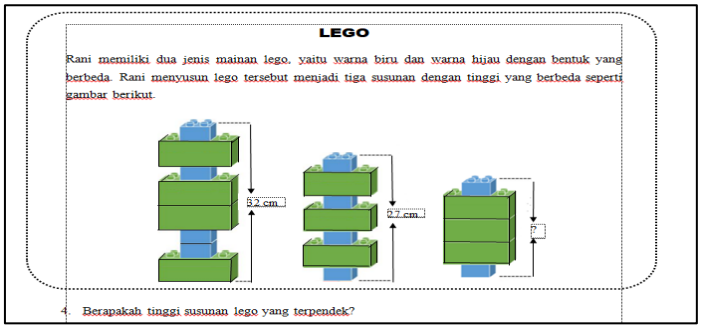


Figure 13. Problem 4 of Mathematical Literacy skills

TN's answer to question 4

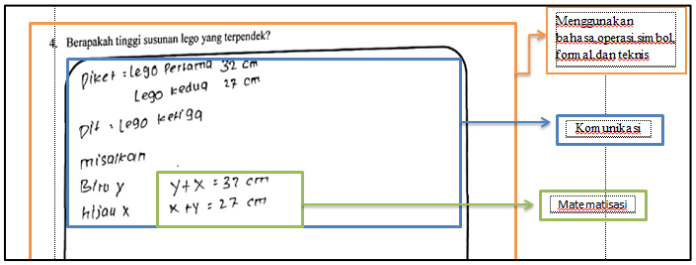


Figure 14. TN's answer to question 4

In solving problem 44, TN only fulfilled three components of mathematical literacy skills. In component 1, TN writes down information from the problems in question. In component 2, TN models real problems into a mathematical form, but the mathematical model made by TN is not correct. In component 3, TN has not been able to use various representations to solve the problem in problem number 4. In component 4, TN has also not been able to write down the arguments to find out how tall the shortest Lego arrangement is. In component 5, TN has also not been able to determine a strategy for solving the problem. The last component that appears is component 6. TN can use a formal form according to the definition of mathematical rules.

According to TN's explanation of the interview results, TN was only able to explain what information was contained in the problem; to model the real problem into a mathematical form, TN was still confused about how to determine it as well as determine the solution.

From the results of interviews conducted with RR and RK, each of them still had difficulty explaining what was known, the examples that were made, and the settlement strategies that could be used to solve the problems.

Table 2. Display of Students' Mathematical Literacy Skills

Subject	Question	COMPONENTS OF MATHEMATICAL LITERACY SKILLS					
		1	2	3	4	5	6
(TN)	1	✓	-	-	-	-	✓
	2	-	✓	✓	✓	✓	✓
	3	✓	✓	-	-	✓	✓
	4	✓	✓	-	-	-	✓
(RR)	1	✓	-	-	-	-	✓
	2	-	✓	✓	✓	✓	✓
	3	✓	✓	✓	-	-	✓
	4	-	-	-	-	-	-
(RK	1	✓	-	-	-	-	✓
	2	-	✓	-	-	-	✓
	3	✓	-	-	-	-	✓
	4	-	-	-	-	-	-

The application of learning was fairly good, with the emergence of 3 principles and 5 characteristics of RME, including the use of contextual problems, where all groups worked on the questions provided in the first and second e-worksheets, according to the findings of observations made during the two meetings. In working on e-worksheets that use contextual problems, most of the groups have used a mathematical model of the problem, namely by doing examples and making mathematical models from these examples. Furthermore, it is also seen that several groups have contributed to discussions with their respective groups; the contributions made by students include conveying their ideas and, for other students who have not been able to solve problems, asking for help from their group mates.

Of the six components of mathematical literacy skills, students with high, medium, and low literacy skills fulfill two of them in question 1, and in questions 2 and 3, students with high and medium literacy skills fulfill five of the components, while students with low literacy skills only fulfill two. These findings are based on the results of the analysis of test data and observations. In question 4, students with high literacy skills fulfill three components, while students with medium and low literacy skills do not fulfill all the components of mathematical literacy skills. There are 3 components that appear most frequently in this study: the communication component, the mathematization component, and the component using language, operations, symbols, and techniques. This finding is in line with research results from Anggrieni (2018); Hasanah et al., (2022); dan Muzaki & Masjudin (2019). One of the components that often appears when students solve mathematical literacy problem is the component using language, operations, symbols, and being formal and technical (Anggrieni,

2018). This component becomes part of RME approach where learning involves using real-life activities and the environment. Students solve the daily life problem by transform it into symbols of mathematical problem-solving models (Sutisna et al., 2018). Research from Hasanah et al. (2022) also shows that of the six components of mathematical literacy skills, the components that appear most frequently are the communication component and the component using language, operations, symbols, formal, and technical. Other studies have also stated that students have high and moderate mathematical literacy skills in the problem recognition section; both subjects are able to state problem information precisely and clearly (Muzaki & Masjudin, 2019). Mathematizing is a part of the RME approach which occurs during the process of student activity in learning as a human activity, both horizontal mathematizing and vertical mathematizing. Students' horizontal mathematization translates real-world issues into mathematical models. In contrast, in the vertical mathematization process, mathematical models that have been symbolically associated with concepts, principles, and rules are employed to generate formal mathematical answers.

The use of e-worksheets based on the PMR approach is considered to be quite effective in improving mathematical literacy skills because based on the principles and characteristics of PMR itself, it can train and guide in a structured way to understand details and appropriate solutions to problems so as to improve students' mathematical literacy skills. This is in line with research conducted by which states that learning that adopts the five characteristics of PMR has been proven to be able to grow students' mathematical literacy skills. Another study by stated that the implementation of the five characteristics of PMR in learning, one of which is the use of PMR-based worksheets, has the potential to improve students' mathematical literacy skills.

Because e-worksheets based on the PMR approach can train and guide students in an organized manner to understand details and appropriate solutions to problems, it is thought to be quite effective in improving their mathematical literacy skills. This is because the e-worksheets are based on the principles and characteristics of PMR itself. This is consistent with study by Budiono & Wardono (2014), who found that teaching using the five PMR characteristics can help students become more mathematically literate. According to a different research by Heriyadi & Prahmana (2020), using worksheets that are based on PMR,

one of the five PMR characteristics, in the learning process has the potential to raise students' mathematical literacy levels.

CONCLUSION

The conclusion is that, of the six components of mathematical literacy skills, the communication component, that is, when students write statements about information from a problem and represent it, appear the most frequently. The mathematization component is when students are able to model real problems. This is based on research conducted at SMPN 1 Talang Kelapa with three subjects who had high, medium, and low levels of mathematical literacy skills. In contrast, components that are rarely seen are those related to representation, when students employ a variety of representations to solve issues; reasoning and argument; and strategy component, when students select methods to address problems.

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REFERENCES

Anggrieni, R. (2018). Analisis Kemampuan Literasi Matematika Siswa dalam Menyelesaikan Soal Tipe PISA 2015. *Universitas Muhammadiyah Surakarta*, *2011*, 472–481.

Anisa Asnawati, Sutrisno, S., & Imaningtyas, I. (2021). Pengembangan E-Student Worksheets (E-SW) Berbasis Literasi Sains dalam Pembelajaran IPA Muatan Gaya untuk Siswa Kelas IV Sekolah Dasar. *Efektor*, *8*(2), 98–109. https://doi.org/10.29407/e.v8i2.16207

Astuti, P. (2018). Kemampuan Berpikir Tingkat Tinggi. *Journal Universiitas Negeri Semarang*, *1*(1), 5–24.

Ayunis, A., & Belia, S. (2021). Pengaruh Pendekatan Realistic Mathematics Education (RME) terhadap Perkembagan Literasi Matematika Siswa di Sekolah Dasar. *Jurnal Basicedu*, *5*(6), 5363–5369. https://doi.org/10.31004/basicedu.v5i6.1508

Budiono, C. S., & Wardono. (2014). Pbm Berorientasi PISA Berpendekatan PMRI Bermedia LKPD Meningkatkan Literasi Matematika Siswa SMP. *Ujme*, *3*(3), 210–219. http://journal.unnes.ac.id/sju/index.php/ujme

Chasanah, I. M. (2021). Proses Matematisasi Siswa SMP dalam Menyelesaikan Masalah

Kontekstual Ditinjau dari Kemampuan Matematika. *MATHEdunesa*, *10*(1), 69–78. https://doi.org/10.26740/mathedunesa.v10n1.p69-78

Hapipi. (2011). *Pendidikan Matematika Realistik (PMR) Sebagai Basis Pembelajaran Matematika*. *62*, 1–13.

Hasanah, U., Sari, N., Sukmaningthias, N., & Nuraeni, Z. (2022). Mathematical Literacy Skills of Junior High School Students Through Blended Learning Based on Indonesian Realistic Mathematics Education Approach. *Proceedings of the 2nd National Conference on Mathematics Education 2021 (NaCoME 2021)*, *656*(NaCoME 2021), 222–230. https://doi.org/10.2991/assehr.k.220403.032

Heriyadi, H., & Prahmana, R. C. I. (2020). Pengembangan Lembar Kegiatan Siswa Menggunakan Pendekatan Pendidikan Matematika Realistik. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, *9*(2), 395–412. https://doi.org/10.24127/ajpm.v9i2.2782

Masjaya, & Wardono. (2018). Pentingnya Kemampuan Literasi Matematika untuk Menumbuhkan Kemampuan Koneksi Matematika dalam Meningatkan SDM. *PRISMA, Prosiding Seminar Nasional Matematika*, *1*, 568–574.

Mirnawati, L. B., Agatha, R., & Fabriya, V. (2022). Penerapan Media Flipbook untuk Meningkatkan Literasi Membaca Siswa SD. *Jurnal Pemikiran Dan Pengembangan Sekolah Dasar)*, *10*(1), 22–38.

Muzaki, A., & Masjudin, M. (2019). Analisis Kemampuan Literasi Matematis Siswa. *Mosharafa: Jurnal Pendidikan Matematika*, *8*(3), 493–502. https://doi.org/10.31980/mosharafa.v8i3.557

Naufal, H., & Amalia, S. R. (2022). Peningkatan Kemampuan Literasi Matematika Siswa Di Era Merdeka Belajar Melalui Model Blended Learning. *Seminar Nasional Pendidikan Matematika Vol. 3 No. 1*, 333–340.

Nolaputra, A. P., Wardono, & Supriyono. (2018). Analisis Kemampuan Literasi Matematika pada Pembelajaran PBL Pendekatan RME Berbantuan Schoology Siswa SMP. *Prosiding Seminar Nasional Matematika*, *1*, 18–32.

Nurhayati, E., Nurfauziah, P., & Fitriani, N. (2021). Memahami Materi Sistem Persamaan Linear Dua Variabel (SPLDV) Dalam Pembelajaran Daring. *Jurnal Pembelajaran Matematika Inovatif*, *4*(6), 1609–1620. https://doi.org/10.22460/jpmi.v4i6.1609-1620

OECD. (2019). *3 . PISA 2018 Mathematics Framework*. 73–96.

Prabawati, M. N., Herman, T., & Turmudi, T. (2019). Pengembangan Lembar Kerja Siswa Berbasis Masalah dengan Strategi Heuristic untuk Meningkatkan Kemampuan Literasi Matematis. *Mosharafa: Jurnal Pendidikan Matematika*, *8*(1), 37–48. https://doi.org/10.31980/mosharafa.v8i1.383

Pratiwi, I., Solihin, L., Atamadiredja, G., & Utama, B. (2020). Risalah kebijakan. *Pusat Penelitian Kebijakan*, *3*(April), 1–8.

Rahayu, L. D., & Kusuma, A. B. (2019). Peran Pendidikan Matematika Di Era Globalisasi. *Prosiding Sendika*, *5*(1), 534–541.

Rahmawati, S., -, H., & -, M. (2021). Analisis Kemampuan Pemecahan Masalah Spldv Menggunakan Indikator Soemarmo. *Lentera Sriwijaya : Jurnal Ilmiah Pendidikan Matematika*, *3*(2), 58–68. https://doi.org/10.36706/jls.v3i2.13924

Setiawati, N. P., Somakim, S., & Araiku, J. (2020). Pengembangan Lembar Kerja Peserta Didik (Lkpd) Berbasis Gerakan Literasi Sekolah (GLS) Materi Bentuk Aljabar Di SMP. *Lentera Sriwijaya : Jurnal Ilmiah Pendidikan Matematika*, *2*(1), 1–12. https://doi.org/10.36706/jls.v2i1.10044

Sohilait, E. (2021). Pembelajaran Matematika Realistik. *OSF Preprints*, 1–10.

Sugianto, D., Abdullah, A. G., Elvyanti, S., & Muladi, Y. (2017). Modul Virtual: Multimedia Flipbook Dasar Teknik Digital. *Innovation of Vocational Technology Education*, *9*(2), 101–116. https://doi.org/10.17509/invotec.v9i2.4860

Sutisna, A. P., Budi, A. S., & Noornia, A. (2018). The Influence of the Realistic Mathematics Education Approach and Early Mathematical Ability to Mathematical Literacy. *International Journal of Multidisciplinary and Current Research*, *6*(04), 798–801. https://doi.org/10.14741/ijmcr/v.6.4.18