

Primary Students' Math Literacy in terms of Higher Order Thinking Skill

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ABSTRAK

Literasi matematika siswa sekolah dasar masih belum memadai. Hal ini disebabkan terbatasnya soal-soal berbasis math literacy, sementara studi menganalisis math literacy memerlukan *high order thinking skills* (HOTS). Study ini bertujuan untuk mengembangkan instrumen dan menganalisis literasi matematika siswa sekolah dasar dengan meninjau *high order thinking* (HOTS). Partisipan study berjumlah 30 siswa kelas lima sekolah dasar dengan mengelompokkan siswa ke dalam tiga tingkatan HOTS, yaitu rendah, sedang, dan tinggi. Metode penelitian menggunakan *mixed-method* (kuantitatif dan kualitatif) dengan desain *explanatory sequential*. Instrumen penelitian berupa soal *math literacy test* (ML-T) awal dengan memperhatikan konten, konteks, proses, dan level. Analisis data menggunakan statistik deskriptif. Hasil study menghasilkan 15 soal yang sudah dinyatakan valid dan reliabel dengan terbagi ke dalam 6 item pada level 1-2 (mudah), 5 item pada level 3-4 (sedang), dan 4 item pada level 5-6 (sulit). Hasil study lain menunjukkan keberhasilan literasi matematika siswa sekolah dasar bergantung pada level soal ML-T dan kemampuan HOTS siswa. Level ML-T yang semakin tinggi cenderung berhasil diselesaikan dengan literasi matematika dalam perspektif level HOTS siswa yang semakin tinggi. Implikasi study ini memberikan sumbangsih dalam mengembangkan instrumen literasi matematika yang autentik dan analisis keberhasilan literasi matematika siswa sekolah dasar dengan memandang level HOTS.

ABSTRACT

Primary students' math literacy is still inadequate. This is due to the limited number of problems based on math literacy, while studies analyzing math literacy require high-order thinking skills (HOTS). This study aims to develop instruments and analyze primary students' math literacy by reviewing high order thinking (HOTS). The study participants were 30 fifth-grade primary school students by grouping students into three HOTS levels: low, medium, and high. The study method uses a mixed-method (quantitative and qualitative) with an explanatory sequential design. The research instrument is an initial math literacy test (ML-T) that focuses on content, context, process, and level. Data analysis used descriptive statistics. The results of the study resulted in 15 ML-T which had been declared valid and reliable, divided into 6 items at levels 1-2 (easy), 5 items at levels 3-4 (enough), and 4 items at levels 5-6 (hard). The results of another study show that the success of primary students' math literacy depends on the level of ML-T problems and students' HOTS abilities. Higher ML-T levels tend to be completed with math literacy in the perspective of higher HOTS levels of students. This study's implication is to contribute to developing authentic math literacy instruments and analyzing the success of primary students' math literacy by looking at the HOTS level.

1. INTRODUCTION

Mathematics learning has an essential role in training primary students to get used to solving problems they encounter in daily activities (Brezovszky et al., 2019; Smith & Mancy, 2018). However, the mathematics concepts at the primary school level are often abstract (Gravemeijer et al., 2017; Herrmann et al., 2022). In this case, primary students need a good conceptual understanding, such as analyzing, reasoning, and thinking when solving problems (Güner & Erbay, 2021; Umbara & Suryadi, 2019). In supporting students to master these abilities, it is necessary to integrate literacy activities into the

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mathematics learning process (Sumirattana et al., 2017; Wang, 2021). The success of literacy in mathematics learning can impact students' mathematical performance at the primary school level and the next level (Amir et al., 2019; Zainiyah & Marsigit, 2019). Experts call literacy skills in mathematics learning the term math literacy (Armstrong et al., 2018; Lara-Porras et al., 2019). The importance of mastering math literacy in the context of problem-solving, namely that students are expected to be able to involve, formulate, and solve mathematical problems in various contexts (Kolar & Hodnik, 2021; Mevarech & Fan, 2018).

The development of existing studies on math literacy in several countries shows a low level of math literacy for primary students. Studies in Germany regarding treatment to improve math literacy in primary students with low math performance have not given positive results at all levels of primary school (Herrmann et al., 2022). Primary students' math literacy from the perspective of self-efficacy in Turkey has not been adequate in visually solving problems without mathematical mediation (Duran & Bekdem, 2013). There are still self-concepts in literacy and mathematics that are not yet qualified for third-grade primary students in Finland (Vasalampi et al., 2020).

The development of math literacy for primary students in Indonesia also shows the low primary students' math literacy. This is shown in the 2018 Program for International Students Assessment (PISA) survey in the mathematics field for Indonesian students, ranked 72nd out of 78 countries. As well as the results of the 2015 Trends in International Mathematics and Science Study (TIMSS) survey, was noted that Indonesian students were ranked 45th out of 48 countries (Nugroho, 2018; Saraswati & Agustika, 2020). The results of studies by several experts related to math literacy at the primary school level lead to the weakness of primary students' math literacy in the context of problem-solving. Several studies have found that math literacy (including in the learning process) of primary school students is still in the "medium" and "low" groups (Ekawati et al., 2020; Fadillah & Ni'mah, 2019). Meanwhile, another study states that students' math literacy performance can be improved through learning that is integrated with literacy activities and familiarizing students with math literacy-based problems to facilitate students in improving their mathematical reasoning abilities (Abidin et al., 2020; Zainiyah & Marsigit, 2019). Thus the development of studies related to math literacy shows that the main factor that causes low primary students' math literacy is due to the unavailability of math literacy-based problems in learning activities at primary school.

In improving math literacy for students, it is important to make innovations in problem-solving learning, one of which is to familiarize students with math literacy-based problems (Campbell et al., 2020; Wilkinson, 2018). When the teacher prepares math literacy-based problems by considering the learning objectives and the elements students understand the rubric for assessing students' literacy levels is still not specifically available (Clarke & Roche, 2018; Rachmaningtyas et al., 2022). Several studies state that the criteria for compiling math literacy problems are based on modifications based on the national curriculum and focus on practical numeracy skills that cover various concepts and aspects of mathematics (Ketonen & Hotulainen, 2019; Prince & Frith, 2020; Saß et al., 2017).

One of the factors that can affect the level of math literacy is high-order thinking skills (HOTS) (Firdaus et al., 2017; Ozeno, 2021). Some teachers believe math literacy involves higher-order thinking skills to apply mathematical knowledge and skills in everyday life (Colwell & Enderson, 2016; Genc & Erbas, 2019). In addition, HOTS is seen as the ability to measure students' math literacy skills (Murtonen & Balloo, 2019; Oktiningrum & Wardhani, 2020).

It is necessary to study math literacy analysis by developing appropriate math literacy problems for primary students. However, studies on the elaboration of math literacy in primary students require objectivity of review (HOTS). When students are given HOTS-based math problems, mathematics has the potential also to affect students' mathematical literacy skills (Oktiningrum & Wardhani, 2020; Uscianowski et al., 2018). So the urgency of this study is to develop math literacy problems and explore the math literacy of primary students by reviewing students' HOTS levels. It is also helpful to ensure the competence of math literacy itself. Meanwhile, the existing studies on primary students' math literacy still do not specifically distinguish the type of problem. Hence, this study's objectives include (1) developing and examining the validity and empirical reliability of math literacy problems for primary students and (2) analyzing primary students' math literacy in terms of the HOTS level.

2. METHOD

This type of research used mixed (quantitative and qualitative) methods with an explanatory sequential design (Creswell & Guetterman, 2018); see Figure 1. This study used a quantitative design to develop math literacy problems through validity and reliability checks. In comparison, the qualitative design analyzes and explores primary students' math literacy at the HOTS level.

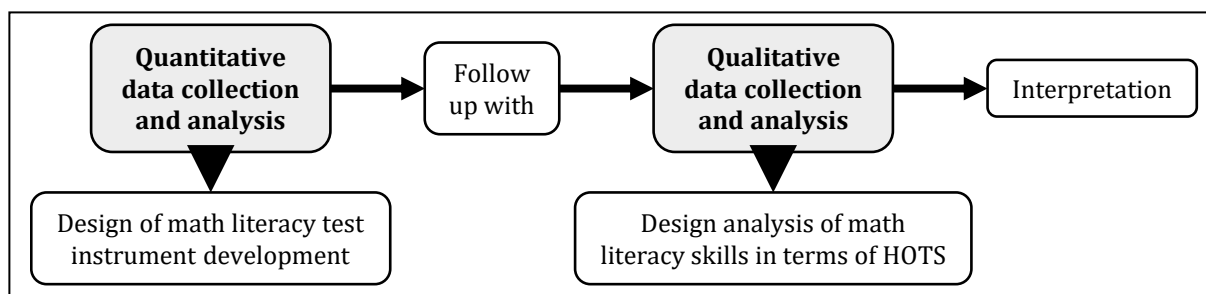


Figure 1. Explanatory Sequential Design

The participants of this study were 30 students in grade-fifth primary school. The participants came from two elementary schools in Sidoarjo, East Java: Kenongo 2 Public Primary School and Tulangan 1 Public Primary School. Participants were selected regardless of their social and economic background. In addition, the purposive sampling technique was done by looking at the level of HOTS.

The data collection technique used the initial math literacy test (ML-T) comprised 16 essay items. In this study, the initial ML-T was developed into ML-T for further analysis of students' math literacy. The ML-T instrument was developed in two stages. Phase 1, designing the ML-T by considering the context, content, process, as well as the six levels of math literacy set by the [OECD \(2019\)](#), which are different at each level, as shown in [Table 1](#). Phase 2, validating the ML-T by the validators. The ML-T instrument would be validated internally and externally. Internal validation was carried out by discussing with mathematicians and elementary school experts for 90 minutes. Then external validation was carried out by means of testing the test instruments given to 10 fifth-grade students in primary schools.

Table 1. ML-T Indicators and Levels

Levels	Math literacy indicators	Items
1 (easy)	Answering problems with a known context, gathering relevant information and taking appropriate action to stimulate problem-solving.	1, 2, 3
2 (easy)	Recognizing situations, using algorithms or formulas, and interpreting them in problem-solving.	4, 5, 6
3 (enough)	Implementing problem-solving strategies, interpreting, and representing problems with reasonable procedures.	7, 8, 9
4 (enough)	Working with solving models effectively in concrete situations, representing a variety of information, and relating it to the real world.	10, 11
5 (hard)	Working in complex situations with models to solve complex problems and select and apply a problem-solving strategy.	12, 13
6 (hard)	Using reasoning, making generalizations, and communicating a problem solving properly and correctly.	14, 15, 16

Table 2. Test results Validity of ML-T Items

Items	r-Count	r-Table	Explanation	Items	r-Count	r-Table	Explanation
Item 1	0,654	0,632	Valid	Item 9	0,794	0,632	Valid
Item 2	0,664	0,632	Valid	Item 10	0,915	0,632	Valid
Item 3	0,771	0,632	Valid	Item 11	0,915	0,632	Valid
Item 4	0,664	0,632	Valid	Item 12	0,915	0,632	Valid
Item 5	0,732	0,632	Valid	Item 13	0,794	0,632	Valid
Item 6	0,681	0,632	Valid	Item 14	0,716	0,632	Valid
Item 7	0,893	0,632	Valid	Item 15	0,637	0,632	Valid
Item 8	0,915	0,632	Valid	Item 16	0,484	0,632	Invalid

Table 3. Description of the HOTS Group by Cognitive Level

Cognitive Levels	Descriptions	HOTS Group
C-4	Able to parse, identify, and determine the pattern of relationships between information into an organized structure.	Low
C-5	Able to make decisions, check, and determine acceptance or rejection of information in a problem.	Medium
C-6	Able to make solutions, design ideas or solutions in solving problems in problems.	High

Data analysis used descriptive statistics on the development of ML-T using validity and reliability tests using IBM SPSS Statistics 25. Then to determine the consistency of the responses to the test results that have been applied, it is carried out using the Cronbach's alpha reliability test. The results of the validity of the ML-T instrument trial showed that only 15 of the 16 items were declared valid, see [Table 2](#). These items were considered valid because the calculated r-value was greater than the r table. Then, 15 items in the ML-T instrument were tested for Cronbach's reliability, showing the results of 0.953, so these items can be considered reliable. Concerning the decision Cronbach's alpha = 0.550 criteria. After that, the ML-T instrument was revised gradually before being tested on 30 participating students. The results of the ML-T instrument testing were carried out using comprehensive coding as "true = 1" and "false = 0". Regarding the analysis of students' math literacy, it was analyzed descriptively based on the indicators in [Table 1](#) by first grouping students based on three categories of HOTS groups using Bloom's Taxonomy perspective: namely high, medium, and low, which was adapted from ([Saraswati & Agustika, 2020](#)), see [Table 3](#).

3. RESULT AND DISCUSSION

Result

The results of the development of the ML-T instrument consisted of 15 items comprising six levels of math literacy. Valid and reliable ML-T was converted into three categories: easy, enough, and hard ([Fadillah & Ni'mah, 2019](#)). The development results of the ML-T instrument can be accessed through <https://doi.org/10.5281/zenodo.6700440>.

Table 4. Math Literacy Components in ML-T

ML-T	Context	Content	Process	Levels
ML-T1 (Item 1)	Scientific	Quantity	Formulate	1
ML-T2 (Item 2)	Personal	Quantity	Formulate	1
ML-T3 (Item 3)	Societal	Space And Shape	Formulate	1
ML-T4 (Item 4)	Personal	Uncertainty And Data	Formulate	2
ML-T5 (Item 5)	Personal	Quantity	Employ	2
ML-T6 (Item 6)	Personal	Change And Relationship	Employ	2
ML-T7 (Item 7)	Societal	Uncertainty And Data	Formulate	3
ML-T8 (Item 8)	Personal	Quantity	Employ	3
ML-T9 (Item 9)	Personal	Quantity	Employ	3
ML-T10 (Item 10)	Personal	Quantity	Interpret	4
ML-T11 (Item 11)	Personal	Change And Relationship	Interpret	4
ML-T12 (Item 12)	Occupational	Quantity	Interpret	5
ML-T13 (Item 13)	Scientific	Space And Shape	Interpret	5
ML-T14 (Item 14)	Scientific	Space And Shape	Interpret	6
ML-T15 (Item 15)	Personal	Quantity	Interpret	6

Researchers classified 15 items in the ML-T based on math literacy components (context, content, process, and level) in [Table 4](#). The ML-T items consist of 6 items at levels 1-2 (easy), 5 items at levels 3-4 (enough), and 4 items at levels 5-6 (hard). Then the ML-T was distributed to students to analyze math literacy skills based on the responses shown in [Table 5](#).

Table 5. Percentage of ML-T Completion by HOTS Group

ML-T levels	Category Student HOTS Group		
	High(%)	Medium(%)	Low(%)
Easy			
ML-T 1	17(100)	8(100)	5(100)
ML-T 2	17(100)	8(100)	5(100)
ML-T 3	13(76)	6(75)	1(20)
ML-T 4	11(65)	5(63)	3(60)
ML-T 5	16(94)	7(88)	4(80)
ML-T 6	13(76)	3(38)	3(0)
Mean	15(85)	6(77)	3(60)
Enough			
ML-T 7	17(100)	8(100)	5(100)
ML-T 8	11(65)	6(75)	2(40)
ML-T 9	2(12)	0(0)	0(0)
ML-T 10	9(53)	2(25)	3(60)
ML-T 11	17(100)	7(88)	4(80)
Mean	11(66)	5(58)	2(56)
Hard			
ML-T 12	4(24)	0(0)	0(0)
ML-T 13	13(76)	1(13)	1(20)
ML-T 14	6(35)	0(0)	0(0)
ML-T 15	3(18)	1(13)	0(0)
Mean	7(38)	6(1)	0(5)

Table 5 shows the results of the responses on the ML-T instrument from the high, medium, and low HOTS groups. Then each group will be analyzed for math literacy at each level on the ML-T instrument. These results show that, on average, students from the three groups can easily complete the ML-T with different percentage levels. Snippets of the analysis of student completion at the ML-T levels easy, enough, and hard are presented in Figures 2 to 7.

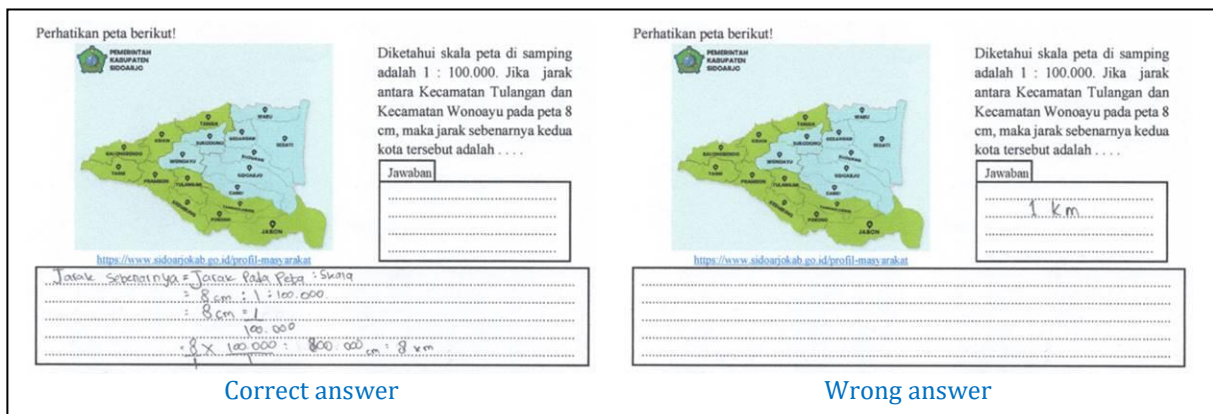


Figure 2. A snippet of Student Answers Towards Level 1 (Easy) on ML-T 3

Figure 2 explains response level 1 (easy) in ML-T 3, which is included in the space and shape content and has a societal context. The information provided by ML-T 3 is in the form of a map of the area of each sub-district in Sidoarjo Regency, the map scale, and the distance on the map between Tulangan District and Wonoayu District. Meanwhile, the problem in ML-T 3 is determining the distance between Tulangan District and Wonoayu District. The correct problem-solving process is by using the scale formula. Students who respond correctly can provide answers using a settlement strategy under the information. Each group showed a different number of students answering correctly, namely 13 students from the high group, 6 from the medium group, and 1 from the low group. While the response to the answer is wrong, students only write answers without being accompanied by problem-solving strategies. This is because students are still foreign and do not understand the information contained in the problems.

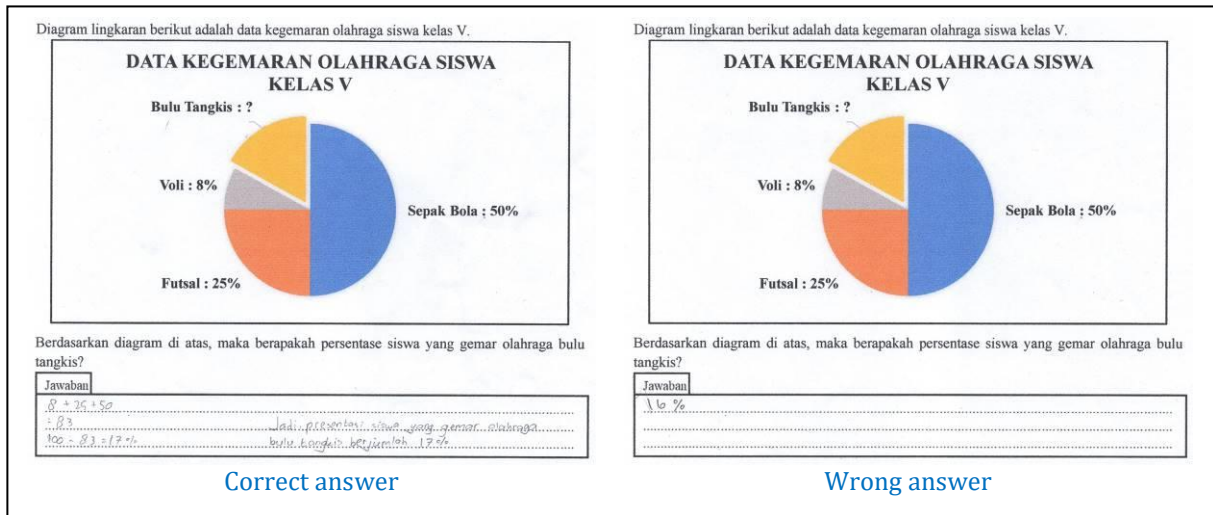


Figure 3. A Snippet of Student Answers Towards Level 2 (Easy) on ML-T 4

Figure 3 explains the response level 2 (easy) on ML-T 4, which is included in the content of uncertainty and data and has a personal context. The information provided by ML-T 4 is in the form of a pie chart about the percentage of the students' favorite sports data. Meanwhile, the problem in ML-T 4 is determining the rate of student sports data that is still unknown. The correct problem-solving process is using a subtraction calculation system. Students who respond correctly are known to have been able to provide answers using a settlement strategy according to the information in the problem. Each group showed a different number of students answering correctly, namely 11 students from the high group, 5 from the medium group, and 3 from the low group. While the response to the wrong answer only shows the answer without being accompanied by a problem-solving strategy.

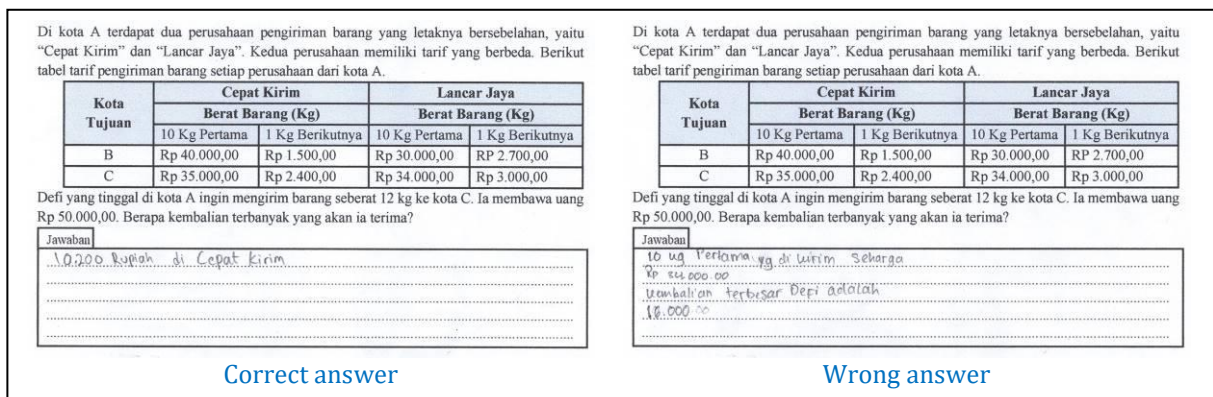


Figure 4. A Snippet of Student Answers Towards Level 3 (Enough) on ML-T 9

Figure 4 explains the response level 3 (enough) on ML-T 9, which is included in quantity content and has a personal context. The information provided by ML-T 9 is the shipping rates from two different shipping services. Meanwhile, the problem with ML-T 9 is determining the highest number of returns for shipping costs between the two shipping services. The correct problem-solving process is to compare the amount of recovery from the shipping costs between the two shipping services. After that, it can be seen the highest number of changes that can be obtained between the two shipping services. Students who respond correctly, students can answer the problem correctly even though the problem-solving strategy provided by students does not yet exist. Each group showed a different number of students answering correctly, namely, from the high group 2 students, and from the medium and low groups, there were no correct answers. In response to the wrong answer, the problem-solving strategy is still not right, resulting in the wrong solution.

Rina mendapatkan tugas dari sekolah untuk membuat kerajinan tangan merangkai bunga. Bunga yang akan digunakan yaitu "Bunga Aster" dan Bunga Tulip".

Bunga Aster **Bunga Tulip**

Kemudian, Rina akan membuat 2 rangkaian bunga dari bunga-bunga itu dengan pola rangkaian sebagai berikut.

Pola Rangkaian 1

Pola Rangkaian 2

Firda yang merupakan teman kelas Rina, juga mendapat tugas yang sama. Namun, Firda menggunakan bunga yang berbeda dengan Rina. Nantinya, Firda akan menggunakan "Bunga Matahari" dan "Bunga Mawar" untuk tugas kerajinannya.

Bunga Matahari **Bunga Mawar**

Jika Firda ingin membuat rangkaian bunga yang sama dengan Rangkaian Pola 2 milik Rina. Apakah ia dapat membuat rangkaian bunga tersebut? jika iya, berapa banyaknya "Bunga Mawar" ia yang perlukan?

Jawaban

16 bunga @ bunga mawar
8 bunga matahari

Correct answer

Rina mendapatkan tugas dari sekolah untuk membuat kerajinan tangan merangkai bunga. Bunga yang akan digunakan yaitu "Bunga Aster" dan Bunga Tulip".

Bunga Aster **Bunga Tulip**

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Bunga Matahari **Bunga Mawar**

Jika Firda ingin membuat rangkaian bunga yang sama dengan Rangkaian Pola 2 milik Rina. Apakah ia dapat membuat rangkaian bunga tersebut? jika iya, berapa banyaknya "Bunga Mawar" ia yang perlukan?

Jawaban

17

Wrong answer

Figure 5. A Snippet of Student Answers Towards Level 4 (Enough) on ML-T 11

Figure 5 explains the response level 4 (enough) on ML-T 11, which is included in the change and relationship content and has a personal context. The information provided by ML-T 11 is the pattern of different flower arrangements. Meanwhile, the problem in ML-T 11 is determining the number of flowers arranged based on the flower arrangement pattern but using different flowers. Students who respond correctly can represent different information on the available problems. Each group showed a different number of students answering correctly, namely 17 students from the high group, 7 from the medium group, and 4 from the low group. While the response to the wrong answer only shows the answer without being accompanied by a problem-solving strategy.

Di kota A terdapat dua perusahaan pengiriman barang yang letaknya bersebelahan, yaitu "Cepat Kirim" dan "Lancar Jaya". Kedua perusahaan memiliki tarif yang berbeda. Berikut tabel tarif pengiriman barang setiap perusahaan dari kota A.

Kota Tujuan	Cepat Kirim		Lancar Jaya	
	Berat Barang (Kg)		Berat Barang (Kg)	
	10 Kg Pertama	1 Kg Berikutnya	10 Kg Pertama	1 Kg Berikutnya
B	Rp 40.000,00	Rp 1.500,00	Rp 30.000,00	RP 2.700,00
C	Rp 35.000,00	Rp 2.400,00	Rp 34.000,00	Rp 3.000,00

Beni tinggal di kota A ingin mengirim paket seberat 20 kg ke kota C, namun ia hanya membawa uang Rp 60.000,00. Ia memutuskan untuk kembali ke rumah mengambil uang karena merasa uangnya tidak cukup. Setujukah kamu dengan keputusan Beni? Jelaskan alasanmu!

Jawaban

10 kg pertama 35.000 jadi. Edo... tidak perlu membayar... karena...
 1 kg... 2.400... jadi...
 10 x 2.400 = 24.000
 35.000 + 24.000 = 59.000

Correct answer

Di kota A terdapat dua perusahaan pengiriman barang yang letaknya bersebelahan, yaitu "Cepat Kirim" dan "Lancar Jaya". Kedua perusahaan memiliki tarif yang berbeda. Berikut tabel tarif pengiriman barang setiap perusahaan dari kota A.

Kota Tujuan	Cepat Kirim		Lancar Jaya	
	Berat Barang (Kg)		Berat Barang (Kg)	
	10 Kg Pertama	1 Kg Berikutnya	10 Kg Pertama	1 Kg Berikutnya
B	Rp 40.000,00	Rp 1.500,00	Rp 30.000,00	RP 2.700,00
C	Rp 35.000,00	Rp 2.400,00	Rp 34.000,00	Rp 3.000,00

Beni tinggal di kota A ingin mengirim paket seberat 20 kg ke kota C, namun ia hanya membawa uang Rp 60.000,00. Ia memutuskan untuk kembali ke rumah mengambil uang karena merasa uangnya tidak cukup. Setujukah kamu dengan keputusan Beni? Jelaskan alasanmu!

Jawaban

Setuju karena 20 kg 70 ribu
jadi uang Beni kurang 10 ribu

Wrong answer

Figure 6. A Snippet of Student Answers Towards Level 5 (Hard) on ML-T 12

Figure 6 explains the response level 5 (hard) on ML-T 12, which is included in quantity content and has an occupational context. The information provided by ML-T 12 is the shipping rates from two different shipping services. Meanwhile, the problem with ML-T 12 is determining the delivery service whose delivery costs are under the available money. The correct problem-solving process is to compare the amount of the return from the shipping costs between the two shipping services. After that, it can be seen which shipping service costs money available. Students who respond correctly can represent different information on the available problems and can provide answers using solving strategies according to the context of the information in the problem. Each group showed a different number of students answering correctly, from the high group to 4 students, and from the medium and low groups,

there were no correct answers from students. In response to the wrong answer, providing an answer argument without being accompanied by a problem-solving strategy but still not correct.

Edo menemukan sebuah logam tak beraturan, dan ia penasaran ingin mengetahui volume bongkahan logam tersebut. Untuk itu Edo memasukkan bongkahan logam tersebut ke dalam gelas ukur. Ternyata ada perubahan ketinggian permukaan air di dalam gelas ukur seperti gambar berikut.

Untuk menentukan volume bongkahan itu, Edo teringat percobaan di sekolah yaitu cara mengukur volume benda tak beraturan. Bagaimanakah cara Edo menghitung volume bongkahan logam tersebut? Tulislah langkah penyelesaiannya!

Jawaban

Jabang... dalam... di... air... sebanyak... 50... ml... Edo memasukkan bongkahan logam... tidak beraturan yang... ia... airnya... menjadi... sebanyak... 100 ml...
Jadi, bongkahan logam... tidak beraturan... volume...nya... adalah... 50 ml

Correct answer

Edo menemukan sebuah logam tak beraturan, dan ia penasaran ingin mengetahui volume bongkahan logam tersebut. Untuk itu Edo memasukkan bongkahan logam tersebut ke dalam gelas ukur. Ternyata ada perubahan ketinggian permukaan air di dalam gelas ukur seperti gambar berikut.

Untuk menentukan volume bongkahan itu, Edo teringat percobaan di sekolah yaitu cara mengukur volume benda tak beraturan. Bagaimanakah cara Edo menghitung volume bongkahan logam tersebut? Tulislah langkah penyelesaiannya!

Jawaban

Jika mengetahui volume bongkahan... air... pada... gelas... 50 ml... ketika... mencapai... 100 ml...
Volume... air...nya... 50 ml

Wrong answer

Figure 7. A Snippet of Student Answers Towards Level 6 (hard) on ML-T 14

Figure 7 explains the response level 6 (hard) on ML-T 14, which is included in the space and shape content and has a scientific context. The information provided by ML-T 14 is the shipping rates from two different shipping services. Meanwhile, the problem with ML-T 14 is determining the highest number of returns for shipping costs between the two shipping services. The correct problem-solving process is to compare the amount of recovery from the shipping costs between the two shipping services. After that, it can be seen the highest number of changes that can be obtained between the two shipping services. Students who respond correctly can represent and identify different information on the available problems and use good reasoning on the problems given in the context of the information in the problems. Each group shows a different number of students answering correctly, that is, from the high group 6 students, and from the medium and low groups, there are no correct answers from students. The wrong answer response provides an answer argument, but it is still not correct.

Discussion

The development of the ML-T instrument obtained 15 problem items based on the components of math literacy: context, content, process, and difficulty level. The ML-T instrument consists of six levels which indicate that the higher the level of math literacy, the higher the difficulty in solving the problem. The high level of problems can shape students' abilities, such as high reading comprehension skills, but it also shows that there are still students who have difficulties with understanding (Abadi & Amir, 2022; Milinia & Amir, 2022; Parhiala et al., 2018). The ML-T development process has undergone several stages to produce a good instrument. With the right instrument, the information obtained in measuring students' math literacy can be relevant, especially for primary students. The ML-T instruments' development results are known to have been declared valid and reliable. This refers to the test results of the ML-T instrument. Instrument validity and reliability are essential indicators of instrument quality (OECD, 2017; Suciati et al., 2020).

Students from the high, medium, and low groups who completed the ML-T level easily could complete the easy math literacy level well. In general, the three groups correctly identified the mathematical literacy problems and provided answers using a solution strategy in accordance with the information. Students in the high category can understand and answer the given problem using logic or the most appropriate solution (Balashov et al., 2021; Zainiyah & Marsigit, 2019). However, in the low group, it is known that some problems are still difficult to solve. It is proven that some students only write answers without attaching problem-solving strategies because they cannot connect mathematical concepts and apply mathematics to reduce problem information (Firdaus et al., 2017; Kaskens et al., 2020).

Students from the high, medium, and low groups who completed the ML-T enough level could complete the easy math literacy level well enough. Most of the students were able to express different information based on the information on the available problems. Students are said to be able, if they have sensitivity in sorting out relevant mathematical concepts, they will be able to use concepts, procedures, and facts to explain problems that arise in the problems they face in everyday life (Suciati et al., 2020;

Wardono et al., 2018). Although, there are still some students who solve problems without problem-solving strategies. As for one of the problems on the enough ML-T level, it shows that the problem-solving process is still considered difficult for some students in the high group, while in the medium and low groups, it is known that they still cannot answer correctly. It is proven that some students still have not been able to find solutions and are less careful in paying attention to the structure of the problem (Amir et al., 2022; Kim & Tawfik, 2021).

At the ML-T level hard answer, only students from the high group could complete quite well on the hard level math literacy. Students can identify different pieces of information in a problem and provide answers using a solution strategy matching the information in the problem. In contrast to the high group, students in the medium and low groups showed poor results. It can be seen that there are still some students who provide argumentative answers without attaching problem-solving strategies that are still wrong. This is because students are still not thorough and are still not familiar with problems accompanied by answer arguments (Amir & Amir, 2021; Brown, 2017; Chu et al., 2017). Math literacy can be said to be good if it can analyze, reason, and communicate mathematical knowledge and skills effectively and can solve and interpret mathematical solutions (Armstrong et al., 2018; Lara-Porrás et al., 2019).

In general, primary students' math literacy ability is still at the medium level. This proves that students' HOTS levels can influence students when solving math literacy-based problems. Meanwhile, students whose HOTS level is still low will be able to affect by the quality of students' math literacy (Lara-Porrás et al., 2019; Purpura & Schmitt, 2019). However, if students' thinking skills are at a high level, students will be able to adapt easily to solving math literacy problems (Campbell et al., 2020; Ozeno, 2021; Wilkinson, 2018). Therefore, primary school students still need more opportunities to learn and familiarize themselves with contextual math literacy problems in various situations (Amir et al., 2019; Kolar & Hodnik, 2021; Kurniawati & Amir, 2022; Lara-Porrás et al., 2019).

The implication of this research is to make an initial contribution to developing an authentic math literacy instrument by referring to the math literacy ability and the HOTS level of primary students. With the implementation of math literacy in learning activities, it is hoped that later, students will be able to understand, identify, apply and develop the role of mathematics in everyday life (Ketonen & Hotulainen, 2019; Wang, 2021). However, this study was limited to the number of participants taken from several schools in one area. Therefore, researchers recommend that further studies be carried out to analyze more deeply by using participants who are more about math literacy by looking at higher-order thinking skills in the process of solving it.

4. CONCLUSION

The developed math literacy problems have appropriate validity and reliability for primary students' abilities. The math literacy problems represent different contexts, content, processes, and levels. Math literacy problems also have three levels (easy, enough, and hard), meaning a hierarchical cognitive level according to the primary students' high-order thinking (low, medium, and high). Hence, the success of primary students' math literacy can be measured from the level of problems and the ability of high-order thinking.

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