

Levels of Students Mathematical Literacy Using Indonesian Culture Context

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ABSTRAK

Literasi matematika menjadi hal penting yang berperan dalam menyelesaikan permasalahan kehidupan sehari-hari. Konten budaya Indonesia digunakan karena budaya berkaitan erat dengan lingkungan dan kehidupan sehari-hari siswa. Tujuan dari penelitian ini adalah untuk mendeskripsikan pencapaian level literasi matematika siswa menggunakan konteks budaya Indonesia. Ini merupakan penelitian deskriptif dengan pendekatan kualitatif. Empat siswa kelas VIII dengan kemampuan matematika tinggi dan kemampuan matematika sedang dipilih untuk menjadi subjek dari penelitian ini. Data dikumpulkan dengan tes dan wawancara. Instrumen dalam penelitian ini adalah tes literasi matematika menggunakan konteks budaya Indonesia dengan level 1 sampai 6 dan pedoman wawancara. Hasil analisis menunjukkan bahwa A1 dan A2 (siswa dengan kemampuan matematika sedang) dapat mencapai indikator literasi matematika level 3. Sedangkan H1 (siswa dengan kemampuan matematika tinggi) mencapai indikator literasi matematika level 3, dan H2 (siswa dengan kemampuan matematika tinggi) dapat mencapai indikator literasi matematika level 4. Pada penelitian ini semua siswa belum mampu mencapai indikator literasi matematika pada level 5 dan level 6.

Keywords: *Literasi matematika, Level literasi matematika, Konteks budaya Indonesia*

ABSTRACT

Mathematical literacy has an important role that needed to solve problems in daily life. Indonesian culture contexts is used because culture is closely related to the environment and daily lives of students. The aim of this research was to describe the achieving level of mathematical literacy of students using Indonesian culture contexts. This was descriptive research with a qualitative approach. Four students in eighth grade with high mathematical ability and average mathematical ability were chosen to be the subjects from this research. The data was collected by test and interview. The instrument in this research was mathematical literacy test used Indonesian culture context with level 1 to 6 and interview guidelines. The analysis result showed that A1 and A2 (students with average mathematical ability) can achieve at level 3 mathematical literacy indicators. While H1 (student with high mathematical ability) achieve at level 3 mathematical literacy indicators, then H2 (student with high mathematical ability) can achieve at level 4 mathematical literacy indicators. In this research all of the students still cannot achieve at level 5 and level 6 mathematical literacy.

Keywords: Mathematical literacy, Mathematical literacy's level, Indonesian culture context

1. Introduction

Literacy has an important role in education because it serves as a basic for knowledge and skills that needed to solve problems in daily life[1]. In addition, in the 2013 curriculum applies something that related to combining literacy with teaching and learning activities [2].Mathematical literacy can provide understanding for someone to recognize the role of mathematics in daily life, so that it can provide that mathematics is not only about the skills of using formulas and calculations [3]. In addition the urgency of mathematical literacy for Indonesian students based on [4] which states that the National Examination in 2021 will be replaced with a minimum competency assessment and character survey, in that assessment a mapping of the two minimum competencies of students is in terms of literacy and numeration.

Mathematical literacy is the ability to interpret mathematics in various life contexts including mathematics reasoning using concepts, procedures and facts to describe, explain a phenomenon or event [5]. Mathematical literacy involves more implementation procedures, which means that the basis of knowledge and competence and confidence to apply this knowledge in the practical world or daily life [6]. It can be concluded that mathematical literacy is an ability that can be applied to help someone understand the role and usefulness of mathematics in everyday life and can solve problems.

The development of Indonesian students' mathematical literacy can be seen in The OECD Program for International Students Assessment (PISA), PISA is a program from OECD to provide assessments to students on an international scale. According to [7] stated that

“PISA assess the extent 15-years-old students, near the end of their compulsory education, have acquired key knowledge and skills that are essential for full participation in modern societies.”

from that, the researchers used the subjects grade 8th, the average age at this grade is 13-14 years, because researchers want to know how the description of students' mathematical literacy before the end of the evaluation of education. Based on [7] the students level of mathematical literacy consist of 6 levels. These same proficiency levels will be used in the reporting of scientific result for PISA, proficiency at each of the six level can be understood in relation to the kinds of mathematics competencies that a student needs to attain at each level [7]. This is in line with [1] that students' literacy skills are divided into six levels, namely levels 1 to 6, level 6 as the highest level of achievement and level 1 is the lowest level of achievement, where this level describes the level of reasoning in solving problems.

Indonesia's participation in the Program for Student Assessment (PISA) shows that the achievements of Indonesian children are not encouraging in the number of reports issued by PISA [8]. In 2012 Indonesia ranked 64 out of 65 countries, in 2015 Indonesia ranked 65 out of 72 countries [5]. In 2018 Indonesia was ranked 71 out of 78 countries [9]. However, the low achievement of Indonesian students in mathematical literacy in PISA because the standard context that used in the PISA test using international context standards, so that there are a lot of foreign contexts that are unknown to Indonesian students[10]. Context is a situation or event or phenomenon in the environment that is related to the mathematical concept that being studied [11]. Context in mathematics is important and has an influence because the use of the right context makes students

interested and challenged to solve a given problem, expressing it into words, pictures, notation, solving strategies and operations [12]. This is in accordance with the research conducted by [13] that the use of contexts that are in accordance with the conditions and locations of students can build knowledge into mathematical representations that are suitable in solving problems creatively and effectively. One of context that close to Indonesian students is Indonesian culture, culture is closely related to the environment and daily lives of students. Context that based on culture is very appropriate to use in mathematics learning because it is related and close to students' daily life [14]. NCTM in [15] states that mathematical abilities are needed because these abilities are used in solving mathematics problem, these abilities include problem solving, communication, connection, and representation

Several research on mathematical literacy in grade 8 junior high school students show that there are several things from students who play a role in solving literacy problems, including research conducted by [16] that mathematical literacy is related to the mathematical disposition of students and the results of the research show that students who have high mathematical dispositions do not easily give up and tend to be confident in solving literacy problems, students with mathematical dispositions are quite confident and do not easily give up in solving literacy problems mathematics, while students with low mathematical dispositions are not confident and easily give up in solving mathematical literacy problems. Furthermore, research conducted by [17] shows that gender has a role in relation to mathematical literacy skills, the results of her research show that some students can work on several questions at different levels and more male students can work on mathematical literacy problems based on PISA. Research conducted by [1] stated that adversity quotient (AQ) has a role in students' mathematical literacy skills in solving PISA questions, the result show that Climber students' mathematical literacy skills at level 5, Camper students' mathematical literacy skills, while Quitter students' mathematical literacy skills are at level 4. However, several studies related to grade 8 mathematical literacy did not discuss the one that plays a role in solving problems in mathematical literacy, namely differences in mathematical abilities. From the description above, researchers are interested in describing the level of mathematical literacy of students using Indonesia culture contexts.

2. Research Method

2.1 Sample of Research

This research is a type of descriptive research with a qualitative approach. In this research, student with grade VIII with various mathematical ability were selected randomly and then they were interviewed to choose 4 subjects with different mathematical abilities, mathematical abilities are obtained from daily mathematical test score. The category of mathematical ability from daily mathematical test score can be seen in table 1.

TABLE 1. Category of mathematical ability

| Number | Score | Category |
|--------|------------------------|----------|
| 1 | score \geq 85 | High |
| 2 | $70 \leq$ score $<$ 85 | Average |
| 3 | score $<$ 70 | Low |

Then two students with average mathematical abilities and two students with high abilities are chosen. In this research, subjects with average mathematical ability for subject 1 given code A1 and subject 2 given code A2, while subjects with high ability for subject 1 given coded H1 and subject 2 given code H2. The data collection method that used in this research was mathematical literacy test and interview method. The data analysis technique used is the technique according to Sugiyono in [18] which includes data reduction which means selecting the main things, presenting data which is a systematic arrangement of information, and drawing conclusions.

2.2 Instrument and Procedures

TABLE 2. PISA Levels of Mathematical literacy

| Level | Abilities that students can do |
|-------|---|
| 6 | Students can conceptualize and generalize by utilizing information based on modelling complex problems (code GH1). They can connect information and represent and translate it (code GH2). They can understand and master the symbolic and formal mathematical operations and relationships (code GH3). And also can reflect their actions and can formulate and communicate the interpretations (code GH4). |
| 5 | Students can develop and work with models for complex problem (code FG1). They can select appropriate problem-solving strategies for complex problem (code FG2). They can reflect on his work and can formulate and communicate the interpretations and reasoning (code FG3). |
| 4 | Students can work with explicit models for complex concrete situations, they can select and integrate symbol and linking to real world situation, they can utilize his skill and can reason in context (code EF1). They can explain his arguments based on his procedure and give interpretation (code EF2). They also can work effectively with explicit model or use alternative solution (code EF3). |
| 3 | Students can execute clearly describe procedure, including that require sequential decision (code DE1). They can select and apply simple-problem solving strategies (code DE2). They can interpret and use representation based on different information source (code DE3). They can show the ability to work with proportional relationship (code DE4). They also can communication their interpretation (code DE5). |
| 2 | Students can interpret and recognize situation in contexts that require direct inference (code CD1). They can extract relevant information from a single source and can employ basic formulas (code CD2). They are capable to make interpretation of the result (code CD3). |
| 1 | Student can identify information and carry out the direct instructions in explicit situation (code BC1). They can perform actions that is obvious and follow from the given stimulli (code BC2). |

In this research, after the subject has been chosen, they are asked to work on mathematical literacy test. This test consists of 6 model problems. Furthermore, the problem in this mathematical literacy test are adapted from level 1 to level 6 on PISA test,

then use Indonesian culture context, especially the Javanese and Balinese culture to meet the needs and objectives of this research. PISA levels of mathematical literacy can be seen in table 2.

Indonesian culture context in this research is needed because context of convincing students is related to the concepts they have learned [19]. This problem on the mathematical literacy test then were validated by expert. See those two problem at Figure 1.

Problem 5
Level 5




Figure 1.5 Batur Mountain
(Source: Kumparan.com)

Mount Batur is a mountain located in Kintamani, Bangli, Bali.
The path to climb Mount Batur is around 6 kilometers, so to go up and down is around 12 kilometers.
Pedestrians must return at 8 pm because the climbing entrance will be closed
Galih estimated that he could climb mountains at an average speed of 1,5 kilometers per hour, and descend at double the speed. This speed takes into account food breaks and other breaks

Question
Using Galih's estimated speed, what is the maximum time he can start climbing so he can return at 8 pm? (Give a settlement procedure and explain your reason)!

Figure 1 The problem on the mathematical literacy test

After the subjects worked on mathematical literacy test, they were interviewed. The interview in this research use semi-structured guidelines, while interview are needed to find out the achievement of indicator level mathematical literacy from subject that not visible in the result of mathematical literacy test

2.3 Data Analysis

The analysis that used in this research was analysis to determine the level of mathematical literacy. Achievement of the level of mathematical literacy of the subjects in this research was identified by indicators adopted from the level of mathematical literacy in PISA.

3 Result and Discussion

3.1 The Mathematical literacy Levels of A1

Figure 2 below shows AI answers for number 1, based on the results and interviews, for indicator identify information and carry out the direct instructions in explicit situation (BC1), A1 can mention important information in the question, namely the size of the batik is 22cm x 7cm and mention what is being asked in the question, namely looking for rotational symmetry and folding symmetry of the known flat shapes of the batik, but for

indicator perform actions that is obvious and follow from the given stimuli (BC2), A1 cannot provide the correct solution or answer to the problem because A1 states that the shape of the batik is a rectangle so that A1 cannot determine the rotational symmetry and the folding symmetry correctly.

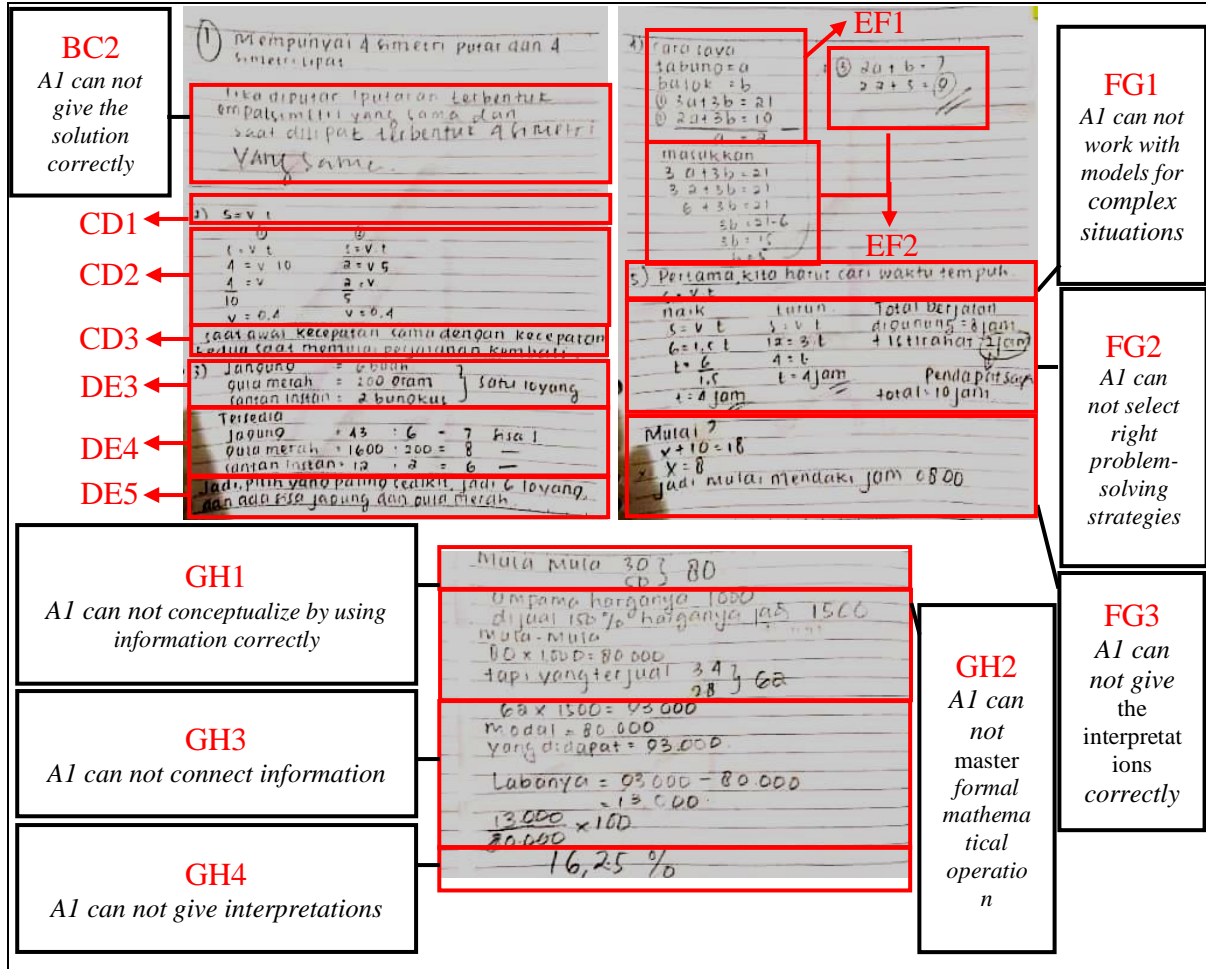


Figure 2 A1 answer

A1 almost meets all the indicators in level 1. Although A1 cannot answer correctly, however based on the interview result, A1 can identify the contexts where all relevant information was present and the questions were clearly defined and A1 can identify information. However, A1 cannot carry out the direct instructions in explicit situation

The answer for number 2, based on the results and interviews, for indicator interpret and recognize situation in contexts that require direct inference (CD1), A1 can state what is known, namely the time and distance that Diana used to ride a bicycle and state the exact thing that was asked, namely the speed that Diana used to ride a bicycle so that from A1's answer in Figure 2 above, A1 can write down the relationship between speed and distance and the time, for indicator extract relevant information from a single source and can employ basic formulas (CD2) A1 can write down the correct formulas and steps to determine the average speed that Diana used to ride her bicycle, for indicator capable to make interpretation of the result (CD3), A1 can write the conclusion of the problem correctly, namely the velocity for the first 10 minutes is the same as the velocity next five minutes. A1 can answer the problem that can measure the ability of level 2 for mathematical literacy. A1 can meet all the indicators of level 2, they are A1 can interpret and recognize situation in contexts that require direct inference, can extract relevant

information from a single source and employ basic formulas, and capable to make interpretation of the result.

| | |
|--|--|
| R : What is known from this problem? Explain it! | |
| A1 : Of course, batik with kawung pattern that have a size of 22cm X 7cm | BC1 |
| R : And what is sought from this problem? Explain it! _____ | |
| A1 : We have to find the folding and rotational symetry from batik whose size is known | BC2 <i>A1 can not give the solution correctly</i> |
| R : From what is known and sought can you find a solution? Please give your reason! | |
| A1 : yes of course, because the shape of batik is a tetahedron so if rotated it forms four symmetries and when it is folded it forms 4 fold symmetries | |

Figure 3 Interview with A1 that Related to The Answer for Number 1

From the answer for number 3, based on the results and the interviews for indicator execute clearly describe procedure, including that require sequential decision (DE1), A1 takes several steps to determine the solution strategy that is used, namely reading the given problem, determining what is known and asked in the problem, and determining the relationship between what is known and what is asked in the problem, for indicator select and apply simple-problem solving strategies (DE2), A1 can choose the right strategy in solving the problem, namely by dividing the available ingredients with the ingredients needed to make corn, for indicator interpret and use representation based on different information source (DE3), A1 writes down what is known in the problem, namely writing down the amount of ingredients such as corn, brown sugar, and coconut milk, for indicator show the ability to work with proportional relationship (DE4), A1 wrote down the steps for solving the problem, namely to determine how many dodol pans that could be made by Mrs. Jaini, A1 dividing the available ingredients with the ingredients needed, for indicator communication the interpretation, A1 can write the conclusion of the problem correctly, namely that Bu Jaiani can make 6 pans of dodol, from the result above shows that A1 can answer the problem that can measure the ability of level 3. A1 can meet all the indicators of level 3.

| | |
|--|-----|
| R : What procedure did you do before you select the strategy to solve this problem? Explain it! | |
| A1 : I read and understand the things that are known in this problem then relate to what was asked | DE1 |
| R : What is strategy that you select to solve this problem? Explain it! | |
| A1 : I divide the available ingredients with the ingredients needed to make a sheed of dodol | DE2 |

Figure 4 Interview with A1 that Related to The Answer for Number 3

Figure 2 also show A1's answer for number 4. Based from the results and the interviews, for indicator work with explicit models for complex concrete situations, select, integrate symbol and linking to real world situation, utilize skill and can reason in context (EF1), A1 can determine what is known and asked precisely, A1 can take the height of the tube with the variable "a" and the height of the tube with the variable "b", A1 can integrate the two variable as the total height if the two structures are arranged together, for indicator explain his arguments based on his procedure and give interpretation (EF2), A1 uses steps or procedures, namely the concept of a two-variable linear equation system to determine the height of the shortest arrangement, A1 is also precise in performing arithmetic operations, A1 can write conclusions to determine the height of the shortest arrangement accurately, for indicator work effectively with explicit model or use alternative solution (EF3), A1 cannot determine other alternative solutions to the problem. So, A1 almost meet all the indicators for level 4. A1 can work with explicit models for complex concrete situations. A1 can select and integrate symbol and linking to real world situation. A1 can utilize the skill and can reason in context, A1 can explain his arguments based on his procedure and give interpretation. However A1 cannot work effectively with explicit model.

| | |
|---|--|
| <p>R : Can you find another alternative solution for this problem? Explain it! A1 : No, I think this is the only solution for this problem</p> | <p>EF3 <i>can not work effectively with explicit model</i></p> |
| <p>R : Can you find another alternative solution for this problem? Explain it! A1 : No, I think this is the only solution for this problem</p> | <p>EF3 <i>can not work effectively with explicit model</i></p> |

Figure 5 Interview with A1 that Related to The Answer for Number 4

From the answer for number 5, based on the results and interviews, A1 cannot meet all the indicators of level 5. A1 has answered the problem but it is still wrong, it means that A1 cannot develop and model with models for complex problems (FG1). A1 cannot select appropriate problem-solving strategies for complex problem (FG2). A1 cannot reflect on his work and cannot formulate and communicate the interpretations and reasoning (FG3). Then from the answer for number 6 show that A1 cannot meet all the indicators of level 6. A1 has answered the problem but it is still wrong, it means that A1 cannot conceptualize and generalize by utilizing information based on modelling complex problems (GH1). A1 cannot connect information and represent and translate it (GH2). Based on the results and interviews from this problem for number 6, A1 cannot understanding and master the symbolic and formal mathematical operations and relationships (GH3), and also A1 cannot reflect their actions and cannot formulate and communicate the interpretations (GH4).

3.2 The Mathematical literacy Levels of A2

Figure 6 below show A2 answers for number 1. Based on the results and interviews, for indicator identify information and carry out the direct instructions in explicit situation (BC1), A2 can mention important information in the problem, namely the size of the batik is 22cm x 7cm and mention what is being asked in the question, namely looking for rotational symmetry and folding symmetry of the rectangular flat shape known from the size of the batik, however for indicator perform actions that is obvious and follow from

the given stimuli (BC2), A2 could not provide a solution or answer to the problem exactly. So, A2 almost meets all the indicators in level 1. Although A2 cannot answer correctly, however based on the interview result, A2 can identify the contexts where all relevant information was present and the questions were clearly defined and A2 can identify information and carry out the direct instructions in explicit situatio. However, A2 has not been able to determine the folding symmetry and rotational symmetry of rectangle.

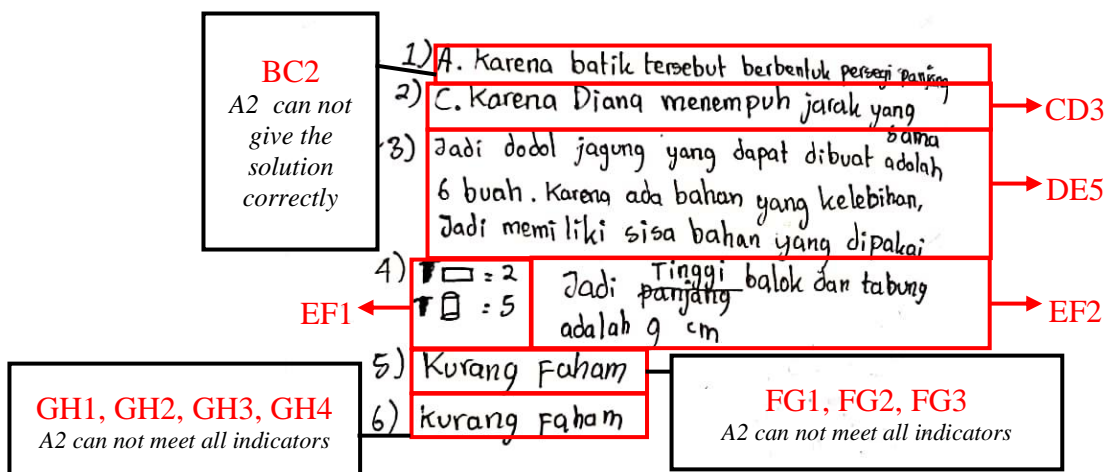


Figure 6 A2 answer

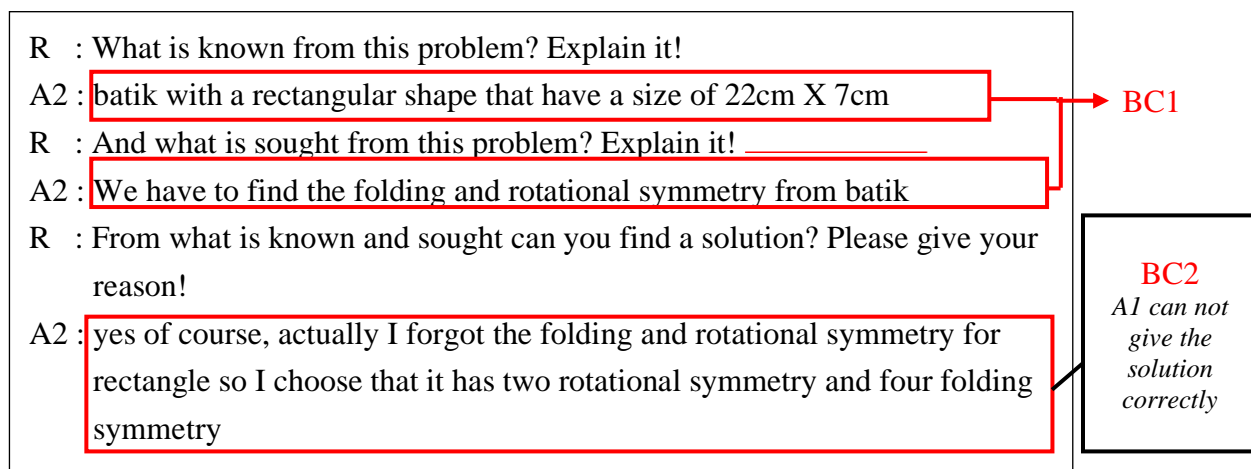


Figure 7 Interview with A2 that Related to The Answer for Number 1

From figure 6 above shows that A2 answer the problem for number 2 correctly, although A2 does not give procedure for his solution. Based on the results and interviews, for indicator interpret and recognize situation in contexts that require direct inference (CD1), A2 can mention what he knows, namely the time and distance Diana took to ride by bicycle, for indicator extract relevant information from a single source and can employ basic formulas (CD2) A2 can determine the correct steps to determine the average speed Diana uses to ride her bicycle, for indicator capable to make interpretation of the result (CD3), A2 can write the conclusion of the problem correctly. A2 meets all the indicators in level 2. It means that A2 can interpret and recognize situation in contexts that require direct inference. A2 can extract relevant information from a single source and A2 can employ basic formulas and procedures to solve problems. A2 is capable to make interpretation of the result.

R : What is known from this problem? Explain it!
A2 : Distance and time that are taken by Diana → CD1
R : What is strategy that you select to solve this problem? Explain it!
A2 : I divide the distance to the time that used by Diana → CD2

Figure 8 Interview with A2 that Related to The Answer for Number 2

A2 can answer the problem for number 3 correctly. Based on the results and interviews, for indicator execute clearly describe procedure, including that require sequential decision (DE1), A2 takes several steps to determine the solution strategy used, namely reading the given problem, determining what is known and asked in the problem, and determining the relationship between what is known and asked in the problem, for indicator select and apply simple-problem solving strategies (DE2), A2 can choose the right strategy in solving the problem, namely by dividing the available ingredients with the ingredients needed to make dodol, for indicator interpret and use representation based on different information source (DE3), A2 determines the amount of ingredients such as corn, brown sugar, and coconut milk available with the many ingredients needed, for indicator show the ability to work with proportional relationship (DE4), A2 divides the available ingredients by the ingredients needed, for indicator communication the interpretation, A2 can write the conclusion of the problem correctly, namely the number of dodol that Bu Jaiani can make is 6 pans. A2 can answer the problem that can measure the ability of level 3. Based on the results and interviews, A2 can meet all the indicators of level 3.

R : What procedure did you do before you select the strategy to solve this problem? Explain it!
A2 : I observe how many ingredients that used to make a sheed of dodol and How many ingredients were available → DE1
R : So how many ingredients that needed to make a sheed of dodol and the amount of the available ingredients?
A2 : To make a sheed of dodol the ingredients are 6 pieces of corn, 200 gr of sugar, and 2 packages of coconut mil, while the available ingredients are 43 pieces of corn, 1,6 kg of sugars and I convert to 1600 gr of sugars and 12 packages of coconut milk → DE3
R : What is strategy that you select to solve this problem? Explain it!
A2 : I divide the available ingredients with the ingredients that used to make a sheed of dodol → DE2
R : What do you get after you divide the vailable ingredients with the ingredients that used to make a sheed of dodol?
A2 : I get 6 sheed of dodol that can be made and there are leftover ingredients → DE4

Figure 9 Interview with A2 that Related to The Answer for Number 3

A2 also can answer the problem for number 4 correctly, although A2 does not give the procedure for the answer. However, based on the result and interviews A2 almost meet all the indicators of level 4. It means A2 can work with explicit models for complex concrete situations. A2 can select and integrate symbol and linking to real world situation. A2 can utilize her skill and can reason in context. A2 can explain her arguments based on her procedure and give interpretation. However A2 cannot work effectively with explicit model.

R : Can you find another alternative solution for this problem? Explain it!

A2 : No, this this the solution

EF4
can not work effectively with explicit model

Figure 10 Interview with A2 that Related to The Answer for Number 4

From figure 3 above shows that A2 does not answer the problem for number 5 and 6. Based on the results and interviews, A2 cannot meets all the indicators in level 5 and level 6.

3.3 The Mathematical literacy Levels of H1

The figure shows handwritten mathematical solutions for three problems, annotated with indicators for mathematical literacy levels:

- Problem 4:**
 - BC2: $3x + 2y = 21$
 - CD3: $2x + 3y = 19$
 - EF1: $x = 2 - y$
 - EF2: $x + 2y = 5 + 2(2) = 9$
- Problem 5:**
 - DE3: Bahan per layang = 6 Jagung, 200 gram gula, 2 bungkus santan instan.
 - DE4: Jika di buat adonan: Jagung = 4 bungkus (sisa 1), gula = 0, Santan instan = 6.
 - DE5: Bu Jai ini dpt membuat 6 layang dadel dg sisa jagung 1 buah dan gula 400 gram.
 - FG1, FG2, FG3: $t = 5$, $v = 12$, $1,2$, $= 0$. Waktu untuk mendaki shg kembali pd Jera 8 malam = 8 Jam.
- Problem 6:**
 - GH1, GH2, GH3, GH4: Perbandingan harga beli gandum gincu dan arumanis = 2:4

A2 can not meet all indicators

Figure 11 H1 answer

Figure 11 shows the answer of H1 for number 1 that H1 answer correctly. Based on the results and interviews, for indicator identify information and carry out the direct instructions in explicit situation (BC1), H1 can mention important information in the question, namely the size of the batik is 22cm x 7cm and mention what is being asked in the question, namely looking for rotational symmetry and folding symmetry of the rectangular flat shape known from the batik, for indicator perform actions that is obvious and follow from the given stimulli (BC2), H1 can provide a solution or answer to the problem precisely that the batik cloth has 2 rotational symmetries and 2 fold symmetries. H1 meets all the indicators in level 1. It means that H1 can identify the contexts where all relevant information was present and the questions were clearly defied and H1 can identify information and carry out the routine procedures according to direct instructions in explicit situation. H1 can perform actions that were obvious.

| | |
|---|-------|
| R : What is known from this problem? Explain it! | |
| H1 : Batik kawung that have a size of 22cm X 7cm | → BC1 |
| R : And what is sought from this problem? Explain it! _____ | |
| H1 : Find the rotational symmetry and folding simmetry from batik which has rectangular shape | |

Figure 12 Interview with H1 that Related to The Answer for Number 1

H1 also can answer the problem for number 2 correctly. Based on the results and interviews, for indicator interpret and recognize situation in contexts that require direct inference (CD1), H1 can mention what is known, namely the time and distance Diana used to ride the bicycle and determine what is being asked exactly, namely the speed Diana used to ride the bicycle, for indicator extract relevant information from a single source and can employ basic formulas (CD2) H1 can determine the appropriate steps to determine the average speed used by Diana in riding a bicycle, namely by finding the speed of the first and second minutes by dividing the distance by time then comparing the results of the two, for indicator capable to make interpretation of the result (CD3), H1 can write the conclusions of the problem correctly, namely the velocity for the first 10 minutes is the same as the velocity next five minutes. H1 meets all the indicators in level 2. It means that H1 can interpret and recognize situation in contexts that require direct inference. H1 can extract relevant information from a single source and H1 can employ basic formulas and procedures to solve problems. H1 is capable to make interpretation of the result.

| | |
|---|-------|
| R : What is known from this problem? Explain it! | |
| H1 : Diana's initial distance and time of the trip and the next trip | → CD1 |
| R : What is strategy that you select to solve this problem? Explain it! | |
| H1 : I compare the initial velocity of the trip with the next trip by dividing the distance to time | → CD2 |

Figure 13 Interview with H1 that Related to The Answer for Number 2

H1 can answer the problem for number 3 correctly. Based on the results and interviews, for indicator execute clearly describe procedure, including that require sequential

decision (DE1), H1 takes several steps to determine the solution strategy used to determine what is known and asked in the problem, and determines the relationship between what is known and asked in the problem, for indicator select and apply simple-problem solving strategies (DE2), H1 can choose the right strategy in solving the problem, namely by dividing the available ingredients with the ingredients needed to make dodol, for indicator interpret and use representation based on different information source (DE3), H1 determines the amount of ingredients such as corn, brown sugar, and coconut milk available with the required amount of ingredients, for indicator show the ability to work with proportional relationship (DE4), H1 divides the available materials with the materials needed, for indicator communication the interpretation, H1 can write the conclusion of the problem correctly, namely the number of dodol that Bu Jaiani can make is 6 pans. H1 can meet all the indicators of level 3. It means that H1 can execute clearly describe procedure, including that require sequential decision. H1 can select and apply simple-problem solving strategies. H1 can interpret and use representation based on different information source. H1 can show the ability to work with proportional relationship. H1 also can communication their interpretation.

| | | |
|----|---|-------|
| R | : What procedure did you do before you select the strategy to solve this problem? Explain it! | |
| H1 | : I compare the ingredients that needed to make a sheed of dodol with the available ingredients | → DE1 |
| R | : Then what is strategy that you select to solve this problem? Explain it! | |
| H1 | : I divide the available ingredients with the ingredients that used to make a sheed of dodol | → DE2 |

Figure 14 Interview with H1 that Related to The Answer for Number 3

Based on the results and interviews for number 4, for indicator work with explicit models for complex concrete situations, select, integrate symbol and linking to real world situation, utilize skill and can reason in context (EF1), H1 can determine what is known and asked precisely, H1 can take the height of the tube with the variable "x" and the height of the tube with the variable "y", H1 can integrate the two variable as the total height if the two structures are arranged together, for indicator explain his arguments based on his procedure and give interpretation (EF2), H1 uses steps or procedures, namely the concept of a two-variable linear equation system to determine the height of the shortest arrangement, H1 is also right in performing arithmetic operations, H1 can write conclusions to determine the height of the shortest arrangement accurately, for indicator work effectively with explicit model or use alternative solution (EF3), H1 cannot determine other alternative solutions to the problem. H1 almost meet all the indicators of level 4, it could be seen from H1 answer for number 4. H1 can work with explicit models for complex concrete situations. H1 can select and integrate symbol and linking to real world situation. H1 can utilize her skill and can reason in context. H1 can explain her arguments based on her procedure and give interpretation. However H1 cannot work effectively with explicit model.

Figure 15 shows that H1 try to answer the question for number 5 and 6, but it still wrong. Based on the results and interviews H1 cannot meet all the indicators of level 5 and level 6. It means that H1 cannot develop and model with models for complex problems. H1 cannot select appropriate problem-solving strategies for complex problem.

Based on the results and interviews H1 cannot reflect on his work and cannot formulate and communicate the interpretations and reasoning. H1 cannot conceptualize and generalize by utilizing information based on modelling complex problems. H1 cannot connect information and represent and translate it. Based on the results and interviews from this problem for number 6, H1 cannot understanding and master the symbolic and formal mathematical operations and relationships, and also H1 cannot reflect their actions and can not formulate and communicate the interpretations.

R : Can you find another alternative solution for this problem? Explain it!
 H1 : I think this is the only solution

EF4
 can not work effectively
 with explicit model

Figure 15 Interview with H1 that Related to The Answer for Number 4

3.4 The Mathematical literacy Levels of H2

The figure shows handwritten mathematical solutions for several problems, with red boxes highlighting specific parts and arrows pointing to literacy level indicators:

- Problem 1:** Calculations for area and symmetry. Indicators: BC1, BC2.
- Problem 2:** Average speed calculations. Indicators: CD1, CD2, CD3.
- Problem 3:** Weight calculations for ingredients. Indicators: DE3, DE4.
- Problem 4:** Geometry problem involving rectangles and squares. Indicators: EF1, EF2, EF3.
- Problem 5:** Speed and time calculations for a boat. Indicators: FG1, FG2, FG3.
- Problem 6:** Weight and ratio calculations. Indicators: CGH1, GH2, GH3, GH4.

Summary boxes for H2's performance:

- FG2:** H2 can select appropriate problem-solving strategies but there are error in calculation
- FG3:** H2 can not meet the indicator
- CGH1, GH2, GH3, GH4:** H2 can not meet all indicators

Figure 16 H2 Answer

From the figure 16 above shows the H2 answer for number 1, based on the test result and interviews, for indicator identify information and carry out the direct instructions in explicit situation (BC1), H2 can mention important information in the problem, namely the size of the batik is 22cm x 7cm and mention what is being asked in the question, namely looking for the rotational symmetry and the folding symmetry of the rectangular flat shape known from the batik, for indicator perform actions that is obvious and follow from the given stimulli (BC2), H2 cannot provide a solution or answer to these problems. H2 almost meets all the indicators in level 1.

H2 answer the problem for number 2 correctly. H2 can answer the problem that can measure the ability of level 2 for mathematical literacy. Based on the results and interviews, H2 meets all the indicators in level 2. For indicator interpret and recognize situation in contexts that require direct inference (CD1), H2 can determine what is known exactly and determine what is asked exactly, for indicator extract relevant information from a single source and can employ basic formulas (CD2) H2 can determine the appropriate steps to determine the average speed used by Diana in riding a bicycle, namely by finding the speed of the first and second minutes by dividing the distance by time then comparing the results of the two, fro indicator capable to make interpretation of the result (CD3), H1 can write the conclusions of the problem correctly, namely the velocity for the first 10 minutes is the same as the velocity next five minutes

Figure 16 also shows that H2 can answer the problem for number 3 correctly. H2 can answer the problem that can measure the ability of level 3. Based on the results and interviews H2 can meet all the indicators of level 3. For indicator execute clearly describe procedure, including that require sequential decision (DE1), H2 takes several steps to determine the solution strategy used to determine what is known and asked in the problem, and determines the relationship between what is known and asked in the problem, for indicator select and apply simple-problem solving strategies (DE2), H2 can choose the right strategy in solving the problem, namely by dividing the available ingredients with the ingredients needed to make dodol, for indicator interpret and use representation based on different information source (DE3), H2 determines the amount of ingredients such as corn, brown sugar, and coconut milk available with the many ingredients needed, for indicator show the ability to work with proportional relationship (DE4), H2 divides the available materials with the materials needed, for indicator communication the interpretation, H2 can write the conclusion of the problem correctly, namely the many dodol that Bu Jaiani can make is 6 pans.

| | | |
|----|---|-------|
| R | : What procedure did you do before you select the strategy to solve this problem? Explain it! | |
| H2 | : I have to know the ingredients that needed to make a sheed of dodol | → DE1 |
| R | : Then what is strategy that you select to solve this problem? Explain it! | |
| H2 | : I divide the available ingredients with the ingredients that used to make a sheed of dodol | → DE2 |

Figure 17 Interview with H2 that Related to The Answer for Number 3

H2 also can answer the problem for number 4 correctly. H2 can meet all the indicators of level 4. Based on the results and interviews, for indicator work with explicit models for complex concrete situations, select, integrate symbol and linking to real world

situation, utilize skill and can reason in context (EF1), H2 can determine what is known and asked precisely, H2 can take the height of the block with the variable "x" and the height of the tube with the variable "y", H2 can integrate the two variables as the total height if the two structures are arranged together, for indicator explain his arguments based on his procedure and give interpretation (EF2), H2 uses steps or procedures, namely the concept of a two-variable linear equation system to determine the height of the shortest arrangement, H2 is also appropriate in performing arithmetic operations, H2 can write conclusions to determine the height of the shortest arrangement accurately, for indicator work effectively with explicit model or use alternative solution (EF3), H2 can use other alternative solutions to determine the solution to these problems.

From H2 answer, H2 try to answer the question for number 5. Based on the results and interviews H2 almost meet all the indicators of level 5. Based on the result and interview H2 can develop and model with models for complex problems. H2 can select appropriate problem-solving strategies for complex problem, based from number 5, H2 can select the appropriate strategies to determine the total time required to climb, H2 can formulate the problem. However H2 is wrong in calculation and H2 cannot reflect on his work and communicate the interpretations so H2 can not conclude what is asked from the problem. In addition, H2 try to answer the problem for number 6, but it is still wrong. H2 cannot meet all the indicators of level 6. It means that H2 cannot conceptualize and generalize by utilizing information based on modelling complex problems. H2 cannot connect information and represent and translate it. Based on the results and interviews from this problem for number 6, H2 cannot understanding and master the symbolic and formal mathematical operations and relationships, and also H2 cannot reflect their actions and cannot formulate and communicate the interpretations.

The comparison of mathematical literacy level between subject with high and average mathematical ability are presented in table 2.

TABLE 2 Comparison of level mathematical literacy between four subject

| Level problem in mathematical literacy test | Subject | | | |
|---|---------|----|----|----|
| | A1 | A2 | H1 | H2 |
| Level 1 | x | x | √ | X |
| Level 2 | √ | √ | √ | √ |
| Level 3 | √ | √ | √ | √ |
| Level 4 | x | x | x | √ |
| Level 5 | x | x | x | x |
| Level 6 | x | x | x | x |

Based [20] who explained that student with high mathematical ability is at level 4 math literacy ability, while student with average mathematical ability is at level 2 of mathematical literacy ability. However, in this research subject with high ability, H1 can achieve at level 1, level 2, and level 3 mathematical literacy indicators, however for level 4, H1 almost meet all indicators at this level and for level 5 and 6, H1 is difficulty to answer the problem correctly. So it can be concluded that H1 can achieve at level 3 mathematical literacy indicators. While H2 is able to meet level 2, level 3, and level 4 indicators, for level 1 and level 5, H2 almost meet all indicators at this level and for level 6, H2 cannot answer correctly. So it can be conclude that H2 can achieve at level 4

mathematical literacy indicators. While subject with average ability, A1 and A2 is able to meet level 2 and level 3 indicators, however for level 4, A1 almost meet all indicators and A2 in this level cannot meet all the mathematical literacy indicators and for level 5 and level 6, A1 and A2 cannot answer the problem correctly. So it can be conclude that A1 and A2 can achieve at level 3 of mathematical literacy.

4 Conclusion

Based on the result from the research, each subject has different level in achieving mathematical literacy using Indonesian culture context. Although not all subject can meet all the indicators given. However some students can interpret problem from the given context, look for the solution that fit the given context quite well, and present their answer. This is appropriate with [5] research that Mathematical literacy is about the ability to interpret mathematics in various life contexts. And also this research suit with [19] research that context of convincing students is related to the concepts they have learned, then looking for solutions that fit the given context. The result from this research are in line with [21] that Indonesian students can meet all of indicators in level 1, 2, 3 of mathematical literacy and some students can meet all indicators in level 4. In this result showed that students have not been able to achieve in level 5 and 6 of mathematical literacy.

Result showed that interview should be done after students complete their mathematical literacy test as soon as possible so that students would not forgot of their answer, in addition students have to practice a lot to solve problems regarding mathematical literacy and teacher can get used to use the context that around students life so that students can interpret mathematics concept to solve the problems that exist in students real world life.

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6 References

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