

The Analysis of Mathematical Literacy Abilities of Primary School Students

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Abstract-This research has a purpose to see the ability of mathematics literacy of elementary school students. The purpose of mathematics subjects mentioned is that learners have the ability to understand, use reasoning, solve problems, communicate and have a respect for mathematics, along with the applicable curriculum emphasizes mathematical literacy. Mathematical literacy is defined as the ability of an individual to formulate, use, and interpret mathematics in various contexts. It includes mathematical reasoning and uses concepts, procedures, facts, and mathematical tools in explaining and predicting phenomena. The mathematics literacy of 5 graders was measured using test questions and the results were analysed. The result is that 5 graders' ability of mathematics literacy is not yet entrenched and the level of student's mathematics ability level is at level 1. It can be seen from the answers given by the 5th graders, there is only one model of completion and problem solving is done almost the same. Problem solving done by the 5 graders has not varied.

Keywords: *mathematics literacy, students, primary school*

I. INTRODUCTION

Regulation of the Minister of National Education 2006 No. 22 which also contains the standard content of mathematics has accommodated and aligned with the development of mathematical literacy. The purpose of mathematics mentioned is that the learners have the ability to understand, use reasoning, solve problems, communicate and have a respect for mathematics. Hall and Matthews (2008) show that the educational aspect has an important role to the progress of a country. In curriculum 2013, there is a change in the learning materials that are developed based on the competence; this is done to meet the aspects of conformity and adequacy, and then accommodate local, national, and international content such as TIMSS, PISA, and PIRLS. The questions used in the Curriculum 2013 textbook

already contain mathematic literacy issues.

The PISA (Program for International Student Assessment) is an international assessment organized by the OECD on the skills and abilities of 15-year-olds (OECD, 2013; Shield, et al., 2007), the age at which students in most countries approach the end of compulsory education (Stacey, 2011). Skills and abilities in PISA assessed include mathematics, reading, and science (OECD, 2003; Stacey, 2012). The first PISA was implemented in 2000 and then implemented every 3 years (Shield, et al., 2007; Kemendikbud, 2011). The ability of mathematical literacy is very important because in everyday life the activities that are experienced by humans often related to mathematics, which requires understanding of literacy in solving it. Mathematical literacy can also help a person to understand the role or usefulness of mathematics in everyday life (OECD; 2013).

Mathematical literacy is defined as the ability of an individual to formulate, use, and interpret mathematics in various contexts. It includes mathematical reasoning and uses concepts, procedures, facts, and mathematical tools in explaining and predicting phenomena. Thus mathematical literacy helps one to recognize the role of mathematics in the world and to make judgments and decisions as citizens (OECD, 2010). The definition of PISA mathematical literacy is in line with the Content Standards of mathematics a subject matter.

The literacy problems of PISA study require reasoning and problem-solving skills that emphasize various problems and situations in everyday life. The abilities tests in PISA are grouped into the process components; they are the ability of understanding and problem solving, reasoning, and communication skills. There are eight mathematical competencies in the PISA problem (OECD, 2010; Jan de Lange, 2006) they are as follow:

- 1) Mathematical thinking and reasoning: posing questions of mathematical characteristics; knowing the kind of answers that mathematics

- offers; distinguishing between different types of reports; understanding and handling the range and limits of mathematical concepts.
- 2) Mathematical argument: knowing what proof is; knowing how the proofs differ from other forms of mathematical reasoning; following and assessing the chain of arguments; having a heuristic feel; creating and expressing mathematical arguments.
 - 3) Mathematical communication: expressing themselves in various ways in visual form orally, in writing, and others; understanding the work of others.
 - 4) Modelling: arranging the field to be modelled; translating reality into the structure of mathematics; interpreting mathematical models in terms of context or reality; working with models; validating the model; reflecting, analysing, and offering criticism of the model or solution; reflecting the modelling process.
 - 5) Problem posing and solving: disguising, formulating, defining, and solving problems in various ways.
 - 6) Representation: decoding, encoding, translating, differentiating and interpreting various forms of representation of mathematical objects and situations and understanding the relationships between different representations
 - 7) Symbols: using symbolic, formal, and technical languages and operations.
 - 8) Equipment and technology: using tools, including the use of appropriate technology.

Based on the OECD (2010) the mathematical literacy includes 3 aspects, they are (1) Process: the ability to formulate and solve mathematical problems and proceed to lead to mathematics; (2) Content: related to mathematical topics: change, growth, spatial, 3-dimensional plane, probability, etc.; (3) Background/Context: deals with the ability to use mathematics in different environments such as schools, work and recreation environments, local communities, and society (Tai, C., Leon, S., And Hung, J., 2014).

Mathematics Ability Levels in PISA: level 6 (Performing conceptions, generalizations and using information based on review and modelling in a complex situation and can use above average knowledge. Connecting different sources of information and representing, translating between information and representation flexibly. Students at this level have high mathematical thinking and reasoning skills. Applying the knowledge, mastery, and relationships of mathematical symbols and operations, developing new strategies and approaches to deal with new situations. Reflecting on their actions, formulating and communicating their actions appropriately and describing in terms of their findings, interpretations, opinions, and conformity to real situations.; level 5 (Developing and working with models for complex situations, identifying problems, and providing assumptions. Choosing, comparing,

and properly evaluating problem solving strategies related to complex problems associated with the model. Working strategically by using broader thinking and reasoning, and appropriately linking representations of symbols and formal characteristics and related knowledge. Reflecting on their work and being able to formulate and communicate their interpretations and reasons.); level 4 (Working effectively with models in concrete but complex situations that may involve limitations to make assumptions. Selecting and combining different representations, including symbols, linking them to real situations. Using a limited range of skills and presenting the reasons with some clear contextual views. Giving explanations and communicating them with arguments based on their interpretations and actions.); level 3 (Implementing procedures clearly, including procedures that require continuous decisions. Solving problems, and applying simple strategies. Interpreting and using representations based on different sources of information and expressing the reasons directly. Communicating the results of their interpretation and reason.); level 2 (Interpreting and recognising the situations with the contexts that require a direct conclusion. Sorting out the relevant information from a single source, and using a single serving method. Working on basic algorithms, use formulas, executing procedures or agreements. Giving precise reasons for the outcome.); level 1 (Answering questions with the known contexts as well as all relevant information available with clear questions. Identifying information and performing common ways based on clear instructions. Showing an action based on the stimulation provided.). Indicators PISA in determining the level of students' mathematical literacy skills in 2012. This study will also use the above competencies to characterize students' mathematics literacy skills.

II. METHODS

This study uses a qualitative field type of research, where researcher trying to describe and analysing the events, phenomena and social activities, attitudes and thoughts of both individuals and groups. This research is equivalent to using descriptive qualitative approach; an approach that is based on all data sources that have been recorded, collected and inferred. The subject of the study was 31 students of 5th grade in primary school Sambiroto 01 Semarang. Data collection techniques in this study are (1) providing tests to measure the ability of mathematical literacy, (2) analysing the test results. Data analysis techniques are data reduction, data presentation and conclusion.

III. RESULTS AND DISCUSSION

These are the tests of mathematical literacy to measure students' mathematics skills. According to PISA (OECD, 2010 [9]) there are 6 levels of students' mathematics skills. There are 5 essay problems; it is

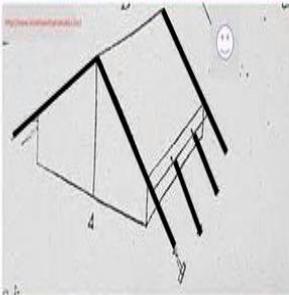
material fraction on class V for even semester in 2016/2017. The problem for the mathematics literacy test is as follows:

1. Perbandingan usia Ayah dan Ibu 4 : 3. Jika jumlah usia keduanya 72 tahun, berapakah usia masing-masing 4 tahun yang akan datang?



1. The comparison between father's age and mother's age is 4:3. If the sum of their age is 72 years, how old will they be four years to come?

2. Untuk mendirikan tenda perkemahan, diperlukan 8 utas tali yang panjangnya $14\frac{2}{5}$ meter. Berapa meter panjang tali setiap utasnya?



2. To build a tent, it is required 8 ropes length of $14\frac{2}{5}$ m. What is the length of each rope?

3. Lia memiliki 36 buku tulis, $\frac{1}{4}$ dari jumlah buku tersebut telah dipakai di kelas 5 dan $\frac{1}{3}$ dari buku tersebut diberikan kepada adiknya, sisanya untuk persiapan di kelas 6. Berapakah jumlah buku Lia untuk persiapan di kelas 6?



3. Lia has 36 books, she had used $\frac{1}{4}$ of the total books when she was at grade 5 and she gave $\frac{1}{3}$ of the total books to her sister, the rest of the books will be used for grade 6 preparation. How many books Lia have for grade 6 preparation?

4. Jumlah tabungan Risma dan Annisa sebesar Rp 1.050.000,00. Perbandingan uang Risma dan Annisa adalah 3 : 4. Berapakah selisih uang Risma dan Annisa?

4. The total of Risma and Annisa's savings is Rp. 1.050.000,00. The comparison of Risma and Annisa's money is 3:4. How much the

difference between Risma and Annisa's money?

5. Pak Hasan mempunyai ladang seluas $5\frac{5}{6}$ ha. $1\frac{1}{5}$ ha ditanami jagung, $2\frac{1}{2}$ ha ditanami singkong, dan sisanya ditanami kacang. Berapa hektarkah bagian yang ditanami kacang?



5. Mr.Hasan has a field with width if $5\frac{5}{6}$ ha. $1\frac{1}{5}$ is planted with corns, $2\frac{1}{2}$ is planted with cassava and the rest is planted with beans. How many ha of the field that is planted with beans?

After the test on 31 5th grader students in Sambiroto Elementary School, consisting of 14 male students and 17 female students, the result is as follows:

- Question Number 1: There are 23 students answering questions with known contexts as well as all relevant information available with clear questions. Identifying information and performing common ways based on clear instructions. Showing an action in accordance with the stimulation provided. There were 7 students who did not answer at all. The 5th graders of mathematics literacy skills have not yet been entrenched and the level of mathematics ability level of students is at level 1. It was seen from the answers given by the 5th graders, there is only one model of completion and the solution of the problem is done almost the same. The problem solving of the fifth graders has not varied, just the same as what his teacher taught.
- Question Number 2: There are 28 students answering questions with known contexts as well as all relevant information available with clear questions. Identifying information and performing common ways based on clear instructions. Showing an action in accordance with the stimulation provided. There were 3 students who did not answer at all. The 5th graders of mathematics literacy ability have not yet been entrenched and the level of the students' mathematics ability level is at level 1. It was seen from the answers given by the 5th graders, there was only one model of completion and the problem solving is done almost the same. Problem solving done by the fifth grade students has not varied.

- 3) Question Number 3: There are 26 students answering questions with known contexts as well as all relevant information available with clear questions. Identifying information and performing common ways based on clear instructions. Showing an action in accordance with the stimulation provided. There were 5 students who did not answer at all. The 5th graders of mathematics literacy skills have not yet been entrenched and the level of mathematics ability level of students is at level 1. It was seen from the answers given by the 5th graders, there was only one model of completion and the solution of the problem is done almost the same. Problem solving done by the fifth grade students has not varied.
- 4) Question Number 4: There are 22 students answering questions with known contexts as well as all relevant information available with clear questions. Identifying information, and perform common ways based on clear instructions. Showing an action in accordance with the stimulation provided. There are 9 students who do not answer at all. The 5th graders of mathematics literacy skills have not yet been entrenched and the level of mathematics ability level of students is at level 1. It was seen from the answers given by the 5th graders only one model of completion and the solution of the problem is done almost the same. Problem solving done by the fifth grade students has not varied.
- 5) Question Number 5: There are 24 students answering questions with known contexts as well as all relevant information available with clear questions. Identifying information and performing common ways based on clear instructions. Showing an action in accordance with the stimulation provided. There were 7 students who did not answer at all. The 5th graders of mathematics literacy skills have not yet been entrenched and the level of mathematics ability level of students is at level 1. It was seen from the answers given by the 5th graders only one model of completion and the solution of the problem is done almost the same. Problem solving done by the fifth grade students has not varied.

IV. CONCLUSIONS

The results of research conducted by researcher on 5th grader students of elementary school can be concluded that the ability of mathematics literacy has not been entrenched and the level of students' mathematics ability level is at level 1. It was seen from the answers given by the 5th graders, there is only one

model of completion and the solution of the problem is done almost the same. The problem solving of the fifth graders has not varied, just the same as what his teacher has taught.

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