DESCRIPTION OF MATHEMATICS LITERACY ABILITY OF STUDENTS FIRST SECONDARY SCHOOL STATE 15 KENDARI BASED ON CONTENT, CONTEXT, MATERIALS, AND PROCESS

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Abstract

The purpose of this study is to describe mathematics literacy ability class VIII-2 First Secondary School State 15 Kendari, based on content, context, materials, and processes. The subjects were students of class VIII-2 First Secondary School State 15 Kendari totaled 20 students. Instruments used in this research is the Literacy Mathematics Test. This test is a standard test that is taken from the PISA tests in 2012, namely mathematical literacy tests to measure mathematical literacy ability students' based on four main domains ie, content, context, material and process. Based on the results of data analysis can be concluded that: (a) Based content tested, the best domain achieved by students is change and relationship with the mean score of each content is 37.75, while in the mean scores achieved by students in the domain of space and shape is at 36.57. Change and relationships is the content most accomplished students, (b) Based on the context, students better understand about literacy in relation to activities in daily life - day. While most complicated context is scientific, (c) Based on the material, as the mean students gain the highest score on the material geometry of space, and the lowest score in the material comparison, and (d) Based processes, mathematical literacy skills of students in a matter of formulating the highest achievement category with a mean score of 43.4. And the lowest is a matter of interpreting the category with a mean score of 19.

Keyword : Mathematics Literacy Ability

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A. INTRODUCTION

Currently the evaluation in education is needed by developed countries in the world. This evaluation is used to formulate policies that support the creation of competitive human resources of the globalization era. Currently there are international programs that assess students' mathematical literacy skills, namely PISA (Programme for International Student Assessment) conducted by the Organization for Economic Cooperation and Development or OECD (Pulungan, 2014: 75). The focus of PISA is the emphasis on the skills and competencies of students who obtained from the school and can be used in everyday life and in various situations (OECD, 2010). According to Wijaya (2014: 2), PISA is aimed at large-scale assessment to determine whether students can apply mathematics in different situations. For this purpose, PISA uses real world problems that require quantitative reasoning, spatial reasoning or problem-solving. That's why the term used for mathematical literacy in the PISA mathematics is not only seen as a discipline of science, but how students can apply the knowledge in a real-world problem or everyday life. So that this knowledge can be helpful deemed more directly by students.

The importance of this mathematical literacy, is not yet in line with Indonesian in the eyes of international student achievement. The fact is the decline of skills of children ages 15 years in implementing real life issues, as demonstrated by the results of the PISA study, would be a serious problem that must be addressed national education. In 2009 Indonesian was ranked 61 out of 65 participants (Balitbang in Maryanti, 2012: 4). PISA mathematical literacy in the focus on students' ability to analyze, justify, and convey ideas secaraefektif, formulate, solve and interpret mathematical problems in a variety of forms and situations. More specifically, questions were tested in PISA consists of the content space and shape, change and relationships, numbers, and probability. Ratings used are based on scores on the mathematics category includes categories of formulating, implementing and interpreting related to problems in real life, outside of a situation or problem that is often discussed in class.

Mathematical literacy itself consists of six levels, the higher the level, the more complex the knowledge necessary to answer the question given. Based on the OECD (2010), in each content tested PISA studied, the mean student in Indonesia was ranked two levels down in solving PISA. This is presumably because during this time of Indonesian students are not familiar with the matter as modeling, where the ability to translate everyday problems in the form of formal mathematics required in completing. There are three main things that become the main ideas of the concept of literacy mathematics, namely (1) the ability to formulate, implement, and interpret mathematics in a variety of contexts, hereinafter referred to as the mathematics, (2) the inclusion of mathematical reasoning and use of concepts, procedures, facts, and mathematical tools to describe, explain, and predict phenomena, and (3) benefit from the literacy skills of mathematics that can help a person in applying mathematics to the everyday world so that their mapping to the success achieved by each school (OECD, 2009: 226).

One form of government attention to the increase in mathematical literacy of students in Indonesia, Kemendikbud appointed Tim IRME (Indonesian Realistic Mathematics Education) to socialize through activities yangdisebut about PISA Mathematical Literacy Contest (MLC) (Sembiring, 2001: 16). In Indonesian, Mathematical Literacy Contest is an important part that

should be implemented and followed by all students who take basic education, both elementary school and junior high, or the equivalent.

Mathematical ability used in the assessment process of mathematics in PISA are (OECD, 2010): 1) Communication, 2) mathematical, 3) representation, 4) Reasoning and Argument, 5) Formulate a strategy to solve the problem, 6) Using symbolic language, formal and engineering, as well as operations, 7) Using mathematical tools.

PISA mathematical skills developed six categories of students who demonstrate cognitive abilities of the students. According to the PISA mathematical ability level consists of six levels (Setiawan, 2014: 4) ie:

Table 1
Characteristics Level Mathematics Literacy

Level	Characteristics
1	a. general context. b. Information relevant to the question clear. c. Can be completed according to the given stimulus.
2	a. Recognizing the situation with direct inference. b. Sorting out relevant information from a single source. c. Implement procedures and give reasons.
3	a. Carry out the procedure properly. b. Require problem-solving strategies. c. Sorting out relevant information from different sources. d. justify.
4.	a. Requires an effective remedy in a concrete situation but complex b. Sorting out relevant information from different sources and connect in real situations c. Use traditional skills and suggests reasons.
Level	Characteristics
5	a. Works by using a complex situation. b. Knowing the obstacles encountered. c. Conduct alleged. d. Choose, compare and evaluate problem-solving strategies.
6	a. Conceptualization and generalization by using the information on the complex situation. b. Linking information and link them together. c. Being able to think and reason mathematically. d. To argue and interpret as adult.

Within the framework of PISA matter, matter is classified into four major domains, namely the category of content, context, materials, and processes. The context of mathematics in PISA can be categorized into four contexts (OECD, 2010; Hayat and Joseph, 2010), namely: a) Personal (private context), b) Occupational (job context), c) Societal (general context), d) Scientific (scientific context), whereas in the PISA content categories, namely: 1) Change and Relationships,

2) Space and Shape, 3) Quantity (Numbers), 4) Uncertainty and Data. Within the framework of PISA 2012 mentioned that the PISA survey in 2012 for the first time report the results by category of mathematical processes (OECD: 2013). This category includes the category of formulating, implementing, and interpreting. Problem is categorized into one of these four groups depending on the dominance of the needs of the process involved in the matter.

Based on the framework about PISA above, the problem in this research is how the mathematical description of the literacy skills of students of First Secondary School State 15 Kendari based on content, context, materials, and processes.

B. METHODS RESEARCH

This research is a descriptive study with the acquisition of data using quantitative descriptive. The main focus of this research is the result of Student Mathematical Literacy Proficiency Test. The research was conducted on a class VIII-2 First Secondary School State 15 Kendari Academic Year 2015/2016 by the number of 20 students. Instruments used in this research that Matematika.Tes Literacy Tests are standardized tests taken from the PISA tests in 2012, which is a test to measure mathematical literacy mathematical literacy ability of students based on four main domains ie, content, context, material and process. Tests are given is a matter of the essay as many as 15 numbers, which consists of 6 levels. Level 1 as much as two numbers, as many as three numbers level 2, level 3 as many as three numbers, as many as 3 numbers of level 4, level 5 by 2 numbers and level 6 by 2 numbers. Grating Mathematical Literacy Test in this study as follows.

Table 2
Grating Mathematical Literacy Test

No. Test	Level Literacy	Material	Content	Context	Process	weight
1	3	Algebra	Change and Relationship	Societal	Employ	3
2	2	Algebra	Change and Relationship	Societal	Formulate	2
3	1	Geometry of space	Shape and Space	Personal	Employ	1
4	4	Geometry of space	Shape and Space	Personal	Formulate	4
5	4	Flat Geometry	Shape and Space	Scientific	Employ	4
6	3	Algebra	Change and Relationship	Occupational	Employ	3
7	2	Flat Geometry	Shape and Space	Societal	Employ	2
8	2	Algebra	Change and Relationship	Societal	Formulate	2
9	6	Geometry of space	Shape and Space	Scientific	Interpret	6
10	1	Algebra	Change and Relationship	Scientific	Formulate	1
11	6	Comparison	Change and Relationship	Societal	Formulate	6
12	3	Flat Geometry	Shape and Space	Societal	Employ	3
13	5	Algebra	Change and Relationship	Occupational	Interpret	5
14	4	Comparison	Change and Relationship	Personal	Interpret	4
15	5	Geometry of space	Shape and Space	Scientific	Employ	5

The data in this research is quantitative data were analyzed descriptively to describe the students' skills in solving problems of mathematical literacy by all levels about the level, context, content, material, and processes in PISA. Scoring guidelines used were analytical scale for problem solving are issued by the Educational Leadership which consists of three parts, namely to understand the problem with a score of 4, solve the problem with a score of 4, and solves the problem by a score of 2 (Kadir, 2010: 108). Furthermore, giving weight to each question according to their level of mathematical literacy. To determine the value of students' mathematical literacy ability obtained by using the formula, as follows:

$$\text{The acquisition value of students (X)} = \frac{\text{Score Acquisition Students}}{\text{Ideal Maximum Score}} \times 100$$

The student acquisition value is the data of this study. If the student received grades ($X \geq 80$), the students are said to have the literacy ability of mathematics are "high". If the student received grades ($60 < X \leq 80$), the students are said to have the literacy ability of mathematics "medium" and when the student received grades ($X < 60$), the students are said to have the literacy ability of mathematics "low".

C. RESEARCH RESULTS

Data mathematics literacy class VIII-2 First Secondary School State 15 Kendari obtained based on the mathematical literacy test tested at class VIII-2 First Secondary School State 15 Kendari. Description of mathematical literacy class VIII-2 First Secondary School State 15 Kendari based on content, context, materials, and processes as follows.

1. Based on Content

Mathematical literacy items were divided into four domains, namely the change and relationship, shape and space, quantity, and uncertainty and data. The function of arithmetic and algebra are summarized in change and relationships, geometry and measurements are summarized in shape and space, a concept of numbers found in quantity, while statistics and data on uncertainty and data. This study, the instrument used does not contain the quantity as well as the uncertainty domain and the data for materials related to that domain is IX. Diagram percentage of average mathematics literacy skills of students of First Secondary School State 15 Kendari to each content as follows.
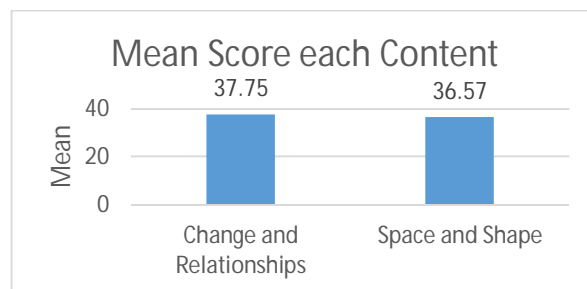

Figure 1. Mean Score class VIII-2 First Secondary School State 15 Kendari for each Content.

Based content tested, the best domain achieved by students is change and relationship with the mean score of each content is 37.75 while in the mean scores achieved by students in the domain of space and shape is at 36.57. Change and relationships is the content most accomplished students. Content change and relationships are often expressed by equation or relation of a general nature, such as addition, subtraction and division. This relationship is also expressed in a variety of symbols of algebra, graphics, geometric shapes and tables. In this research, space and shape content is content with a mean score - average lower than change and relationships. This mathematical content related to a geometry lesson. In space and shape content includes students' ability to recognize shapes, determine similarities / differences in various dimensions and forms of representation.

2. Based on Context

Mathematical literacy items consist of four domains, namely, personal, occupational, societal and scientific. Personal context includes issues relating to the daily life of students. The context of occupational related to the world of work or profession. Societal context related to the scientific community, while the context associated with the academic world. Diagram percentage of average literacy math class VIII-2 First Secondary School State 15 Kendari to each context as follows.
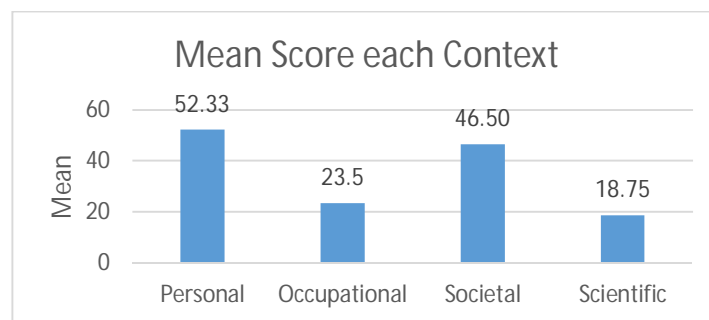

Figure 2. Mean Score class VIII-2 First Secondary School State 15 Kendari for each Context.

Figure 2 shows that the students a better understanding of literacy problems associated with the activities of everyday life. This is shown from a high mean score obtained by the students in the personal context as compared to the three other context. Scientific context is the context of the most complicated by the students in this study. Scientific contexts relating to scientific activities that are more abstract and requires the understanding and mastery of theory in problem solving. Occupational context relates to a work environment. The context of this work can be things such as measuring, pricing and ordering building materials, calculate salaries, quality control, scheduling and architecture. Societal context associated with the use of mathematical knowledge in society at local, national, and global. This context can be a problem of public transport, government, public policy, demographics and even national statistics.

3. Based on Material

Mathematical literacy items consisted of four items namely Algebra, Geometry panel, Geometry room, and Comparison. Diagram percentage of average literacy math class VIII-2 First Secondary School State 15 Kendari to each material as follows:
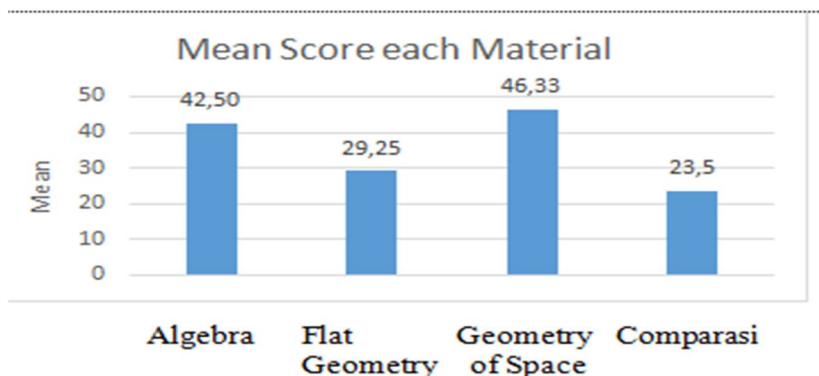

Figure 3. Mean Score class VIII-2 First Secondary School State 15 Kendari for each material

Based on Figure 3. seen that on average students gain the highest score on the material geometry. Difficulties students on average lie in the material comparison. It is also influenced by the degree level on items such materials. In the average student is only able to work on the problems at low levels in a general context, the question very clearly and use simple mathematical operations, for example, students just entering the value stated clearly in the problem into a formula which they memorized. Students difficulty in producing a method or connect between mathematical concepts. From these results seen that the average literacy students' mathematical competence only to the connection. Students are not able to interpret mathematical skills in everyday life.

4. Based on Processes

Within the framework of PISA 2012 mentioned that there are three categories of mathematics assessment process. This category includes categories formulate, implement and interpret. Diagram percentage of average literacy math class VIII-2 First Secondary School State 15 Kendari for each category of mathematics assessment process as follows.
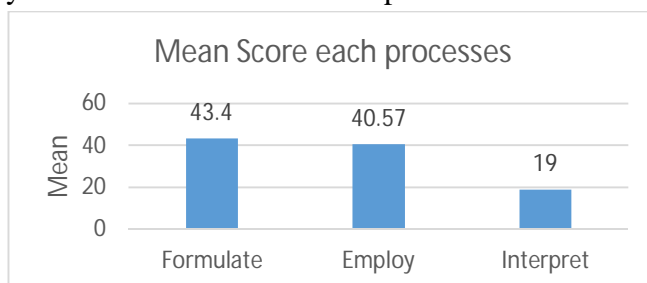

Figure 4. Mean Score class VIII-2 First Secondary School State 15 Kendari for each processes.

Figure 4. informs that the literacy skills of mathematics students in the problem category formulating or formulate the highest achievement. This indicates that the student knows more about

PISA are in the process of settlement is dominated by the interpretation of the contextual problems in the mathematical model (mathematical). Basic math skills of students will be instrumental in the process of implementing the concept or principle in finding a mathematical solution. In the matter of applying and interpreting category, students have not been able to realize its knowledge optimally so that the results are not optimal. In the mean score in a matter of applying the category was 40.57 while in the matter of interpreting ketagori is 19.

D. DISCUSSION

In this study, the maximum value of the overall level is the acquisition of literacy math test scores of students for each level. Based on the results seen that the average student is only able to resolve the matter as a whole is less than 60%. In the mean no student is able to reach a value of more than 60 for all levels on the matter. The highest value of the test results of students mathematical literacy is 60.

The test results of mathematical literacy in First Secondary School State 15 Kendari showed that the literacy ability of students of First Secondary School State 15 Kendari still low. This suggests that mathematical literacy skills or abilities that refers to the capacity to formulate, implement and interpret mathematics in various contexts are still low (OECD, 2013).

Basic math skills (communication, representation, designing strategies, mathematical, reasoning and argumentation, use of language and symbolic operation and use of mathematical tools) also determines the mathematical literacy achievement test results. According to the OECD (2013), a math problem solver is someone who is able to use math in solving contextual problems through several stages as described PISA as follows.

1. To solve a contextual problem, one must implement measures and mathematical ideas to solve this problem. This action involves the ability to use traditional knowledge and math skills, which largely depends on the ability of so-called PISA as basic math ability (Fundamental Mathematical Capabilities).

2. The process of mathematical literacy departing from identifying contextual issues, and formulate the problem mathematically based on the concepts and relationships inherent in the problem. After changing the contextual problems into mathematical form, the next step is to apply a mathematical procedure for obtaining 'mathematical results'. This stage typically involves activities such as manipulating, reasonable, and counting. Mathematical results obtained was then reinterpreted in the form of results related to the initial problem.

3. In the process of formulating, implementing, and interpreting, basic mathematical ability will be activated consecutively and simultaneously rely on mathematical content of topics appropriate to obtain a solution.

Based on the test results literacy class VIII-2 First Secondary School State 15 Kendari seen that the scores achieved by students in each items is very diverse. There are some students who are able to solve problems with the maximum score and some students who are not able to answer questions. In the average student is able to solve problems at the level of 1-3 by 29.36%, while the problem at the level of 4-6 is the average student only reached 6%.

From the student's work shows that the lack of mathematical literacy skills of students due to lack of basic math skills of students. Students' poor understanding of matter in the form of stories and construct the mathematical model. When students are confronted with questions of applied, the student's ability to solve problems is very weak because the learning process suggested in the curriculum we only leads to reading, writing skills and numeracy.

E. CONCLUSIONS

Based on the results of research and discussion that has been stated previously, it can be concluded as follows:

1. Based content tested, the best domain achieved by students is change and relationship with the mean score of each content is 37.75, while in the mean scores achieved by students in the domain of space and shape is at 36.57. Change and relationships is the content most accomplished students.
2. Based on the context, students better understand about literacy in relation to activities in daily life - day. While most complicated context is scientific.
3. Based on the material, as the mean students gain the highest score on the material geometry of space, and the lowest score in the material comparison.
4. Based on processes, mathematical literacy skills of students in a matter of formulating the highest achievement category with a mean score of 43.4. And the lowest is a matter of interpreting the category with a mean score of 19.

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