MATHEMATICAL LITERACY TO CLASS VII STUDENTS IN TERMS OF SELF REGULATED LEARNING

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Abstract:
This study aims to describe the mathematical literacy of class VII students in problems solving by loading indicators of mathematical literacy in terms of self regulated learning. This type of research is descriptive qualitative and the subject-taking technique is based on random sampling technique, obtained nine students in each category self regulated learning represented by three students to represent each (high, moderate and low category). The results showed that subjects with high self regulated learning were able to complete the three questions containing the seven indicators of mathematical literacy, subjects with moderate self regulated learning achieved good enough mathematical literacy skills, could achieve the seven indicators of mathematical literacy skills even though there were some errors in calculations and basic concepts and subjects with low self regulated learning on average did not reach the seven indicators of mathematical literacy only reached the first indicator to the fourth indicator.
Keywords : *Mathematical Literacy, Self Regulated Learning*

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1.   Introduction

Mathematics needs to be taught at every level of education. By studying mathematics students' can develop logical, systematic, analytical, critical, and creative thinking skills (Tasekeb, Wardono, & Mulyono, 2019). Mathematics is a subject that requires problem-solving skills. On the other hand, in the process of solving mathematical problems, mathematical literacy is required.

According to *the Great Indonesian Dictionary* (KBBI) Mathematical Literacy is described as follows: literacy is a personal ability to process information and knowledge for life skills, while Nugraha (2016) defines literacy as the ability to read and write, then develops into a process of reading, writing, speaking, hear, imagine, and see. Literacy according to *the Program for International Student Assessment* (PISA) quoted by Aminah & Karomah (2019), is defined as knowledge and skills for adult life.

The term mathematical literacy has five main elements in problem-solving by *the National Council of Teacher of Mathematics* (NCTM), including exploring, mathematically proving, communication, connection, and representation (Allen et al., 2020). Meanwhile, Ojose (2011) stated that mathematical literacy is the knowledge to reveal and apply the basics of mathematics in everyday life. In line with the opinion of Johar (2012) that explain mathematical literacy emphasizes knowledge and understanding of mathematical concepts are very important, but it is more important to implement literacy to solve problems in everyday life, as well as the individual's ability to formulate, apply and interpret mathematics in various contexts.

Mathematical literacy is defined as an individual's ability to formulate mathematics, apply mathematics and interpret mathematics in various contexts, including systematically reasoning and using concepts, procedures, and facts to explain and interpret phenomena or events (Habibi & Suparman, 2020). Wardono et al (2016) acknowledge that the application of mathematical literacy in the process of solving mathematical problems in everyday life is essential. Mathematics learning in school hood is still considered tough by some students that are not interested in participating in mathematics learning therefore it is necessary to see student readiness, including their learning independence process. In applying mathematical literacy, it must include relevant mathematical concepts, mathematically modeled life contexts, increase conceptual understanding and thinking skill development (Syahlan, 2015).

The importance of mathematical literacy skills is shown *by the Program for International Student Assessment* (PISA) study conducted in 2015 indicating that Indonesian students' mathematical literacy skills are not optimal yet, as shown in the results of a survey that Indonesia is ranked 69th out of 76 countries (Education, 2015). The survey outcome was responded by several researchers who have studied mathematical literacy in Indonesia, such as Masjaya & Wardono (2018), Sari & Wijaya (2017), which aim to improve mathematical literacy skills with various models and learning approaches applied. Allen et al (2020) stated that several important aspects must be studied to improve literacy skills, among others, equality in mathematical education, high ambition, and participation in learning mathematics with good understanding and actively developing their knowledge.

Learning independence is seen as one aspect that affects student motivation to learn as if students are well prepared, enthusiasm for learning will arise. Learning independence is an awareness activity to learn without any encouragement from the environment around and also realize their responsibility as a student in dealing with learning difficulties (Yanti Silvia, 2017). Participation in mathematics learning is seen from preparation, which means that before participating in learning at school it takes time for independent study to build self-confidence (Supriani, 2017). Alhadi & Supriyanto (2017), claim that the results of the study of learning independence refer to the process of students systematically directing themselves to understand the lessons given and behave in a learning activity. It is necessary to prepare students' self regulatedd learning in implementing mathematical literacy ability so that students can respond or solve problems related to mathematics with enthusiasm to achieve learning objectives. Based on the description above, this study will describe the ability of students' mathematical literacy in terms of self regulated learning in seventh-grade students of Liman State Junior High School.

2.   Methodology

This research is descriptive with a qualitative approach. The research was conducted on seventh-grade students of Liman State Junior High School in the Academic Year 2021/2022. The main subjects in this study were seventh-graders in grades A and B. Observations and interviews with teachers were conducted to determine the participation and activeness of students in mathematics learning activities to determine the categories of students who have high, medium, and low self regulated learning.The instruments used in this study include interview guidelines, questions about

mathematical literacy, and learning independence questionnaires. Data sources in this study are the results of tests, questionnaires, interviews, and documentation. The data collection technique in this study was to provide three test items for mathematical literacy skills in the form of stories questions and disseminating learning independence questionnaires. After the questions and questionnaires have been validated, hereafter the questions are given to the research subject to be solved along with the questionnaire. Subject taking technique based on random sampling technique obtained 9 subjects to represent each category of learning independence, namely 3 subjects representing high learning independence, 3 subjects representing moderate learning independence and 3 subjects representing low learning independence. The results of student work with subject interview guidelines will be corrected and nine subjects selected as analysis material. Data analysis in this study uses the Miles and Huberman model, which includes: (1) data reduction, (2) data presentation, (3) drawing conclusions.

3.   Result and Discussion

The test of learning outcomes of mathematical literacy abilities of students with low, medium, and high self regulated learning skills using indicators of mathematical literacy ability as follows (1) Communication, (2) Mathematising, (3) Representation, (4) Reasoning and Argument, (5) Devising Strategies, (6) Using Symbols, (7) Using Mathematics Tools. Learning outcomes test using three items of literacy ability test can be described in table 1 as follows.

Table 3.1. Items for Mathematical Literacy Ability Test

Number	Item
1	A rectangle has the length $(2x+3)$ cm and width $(x+6)$ cm with a perimeter of 60 cm, what is area of a rectangle?
2	A rectangular futsal court has an area of 150 m^2. The futsal field will be given a barrier on each side of the field. It costs IDR 25,000 for the installation of a barrier per meter. a) What is the perimeter of the futsal field? b) What is the total cost required for the installation of the futsal field barrier? Write down in detail what is known and what is being asked and then the steps in problem solving process!
3	A city park is in the shape of a rhombus with an area of 384 m^2. The government wants to build a road around the park with a width of 1 m measured from each corner of the park. The entire road surface will be tiled for IDR 35,000.00/m^2. a) Describe the parks and roads that will be built by the government. b) If the government has IDR. 2,000,000.00, is it sufficient to build a road around the park? Write in detail the steps to solve the problem above!

Interviews and tests were conducted on three research subjects based on each category of self regulated learning. The results of self regulated learning questionnaire analysis are in table 2.

Table 2 analysis of self regulated learning

Self Regulated Learning Category	Student	Percentage
High self regulated learning	11	34,375%
Moderate self regulated learning	11	34,375%
Low self regulated learning	10	31,25%
Quntity	32	100%

Table 2, the questionnaire analysis then selected nine students randomly from the three categories, each category of learning independence was represented by three students for interviews and analysis of work results.

By the three available questions, three students will be represented in high learning independence, the subject is given a code of STA for the subject who is working on question number 1, STB for the subject who is working on question number 2 and STC for the subject who is working on question number 3. Subjects with moderate independence will be represented by 3 subjects, the subject is coded SSA for the subject working on question number 1, SSB for the subject working on question number 2 and SSC for the subject working on question number 3. In the low learning independence category, 3 people were randomly selected to work on the questions with the subject code given SRA for students working on question number 1, SRB for subjects working on question number 2 and SRC for subjects working on question number 3.

3.1 Mathematical Literacy for High Self Regulated Learning

Subjects with high learning independence on mathematical literacy skills in solving questions number 1, 2 and 3 which contain indicators of mathematical literacy Communication, Mathematising, Representation, Reasoning and Argument, Devising Strategies, Using Symbols, Using Mathematics Tool. Subjects with high learning independence can answer the questions given by the researcher completely and correctly . Based on the results of the work, the subject can understand the questions well, answer questions, sketch and provide conclusions on answers correctly and correctly. The results of the work are shown in Figure 1, Figure 2 and Figure 3.

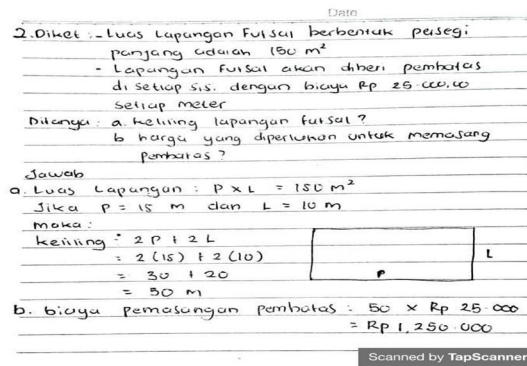**Figure 1 result of question number 1 subject STA**

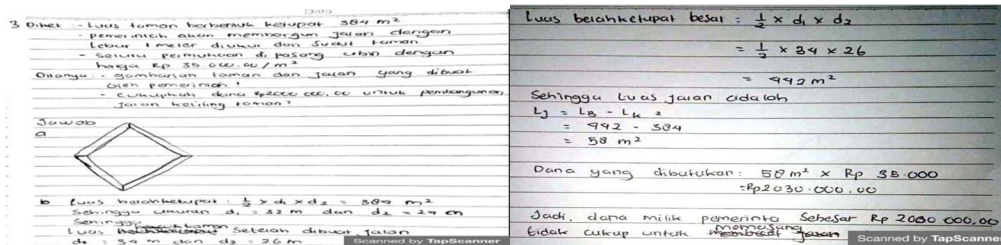**Figure 2 results of question number 2 subject STB**

Figure 3 the results of question number 3 subject STC

In Figure 1, the STA subject answers questions in a rare order and is done correctly until he draws conclusions from the questions being worked on. STA subjects are able to make mathematical equations needed to help solve problems. The following is an excerpt from the interview with the STA subject in concluding question number 1.

Researcher : "*From the question number 1 that has been done, what concept do we use and what kind of description does it work?*".

STA : "*Using the concept of substitution, elimination continues around the perimeter of the rectangle. The conclusion is that after finding the length and width, sir, you have to look for x first, so that you can use elimination substitution, sir."*

From the interview schedule supported by the results of the work, it is clear that the STA subject is able to master and solve problem number 1 properly and correctly. STB subjects in solving problem number 2 correctly and correctly seen from Figure 2 the subject seems to understand and conclude the questions given by the researcher seen from interview quotes.

Researcher : *"Give your argument or opinion, why do you make such a conclusion?"*

STB : ""*" The point is, sir, to find out what the total price needed for the installation of the futsal barrier is, look around first, because the field barrier is on the edges of the field, so that's about it, sir"*

From the interview schedule, the STB subject was able to sketch and firmly conclude question number 2 correctly. In Figure 3, the STC subject is able to describe the questions with and during the interview the subject can conclude the questions correctly. Here is the interview excerpt.

Researcher : " *"Are you sure the answer is complete. Try to give the solution you made, what is the conclusion?"*

STC   : *"Yes sir. So first I drew the garden and then I looked for the area of the whole rhombus with the reduced size rhombus, I found the required tile area, then multiplied by the tile price per meter. In conclusion, the government funds are not enough to build a roadside park".*

Based on the results of the work and interview quotes, subjects with high learning independence can answer questions number 1, 2 and 3 correctly given by the researcher, the subject sketches a rectangular image, futsal field, city park and the subject can also make the right mathematical symbols to help the process of solving problems and being able to conclude the three questions correctly and correctly.This proves that subjects with high learning independence can use Communication, Representation Mathematizing, Using Symbols, Devising Strategies, Using Mathematics Tools and Reason and Argument on indicators of mathematical literacy well.

3.2 Mathematical Literacy for Medium Self Regulated Learning

Subjects of moderate learning independence towards mathematical literacy skills can solve questions number 1, 2, and 3 which contain mathematical literacy indicators Communication, Representation, Mathematizing, Using Symbols, Devising Strategies, Using Mathematics Tool and Reason and Argument. From the three questions, the subject can solve the problem appropriate and correctly and conclude the problem. The results of the work of the subject of moderate learning independence for questions number 1, 2, and 3 are shown in the following figure.

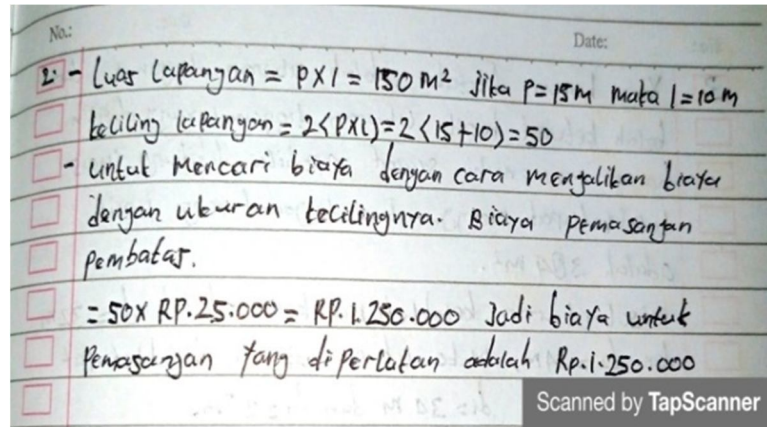**Figure 4 result of question number 1 subject SSA**

Figure 5 results of question number 2 subject SSB
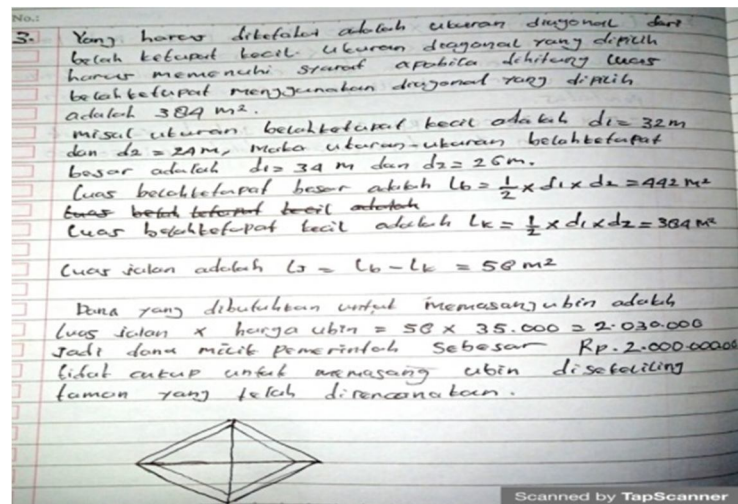

Figure 6 the results of question number 3 subject SSC

Figure 4 shows the work of the SSA subject who answered question number 1 with sequential steps and was done correctly and made conclusions from the questions that were worked on and the SSA subject was able to make the mathematical equations needed in the problem to solve the problem. The following is an excerpt from the interview with the SSA subject in concluding the question number 1 listed.

Researcher   : *What concepts are applied to question number 1 and what are the conclusions?*
SSA   : "U*sing the concept of rectangle, elimination and elimination. In conclusion, look for the x value first, then eliminate it. That's the x first, sir, so that you find the length and width, so you can find the perimeter of the rectangle later.*".

SSA subjects with moderate learning independence are able to answer question number 1 correctly and can conclude correctly but the subject is lacking in sketching the answer. The SSB subject with moderate learning independence in solving problem number 2 can be seen in Figure 5, it appears that the SSB subject is able to solve the problem correctly and is able to conclude correctly. The following is an excerpt from an interview with the subject.

Researcher   : "*From the solution you made, what is the conclusion?"*

SSB : *"Sir. So the total cost required for the installation of a futsal field barrier is one million two hundred and fifty thousand rupiah. I usually when I make a conclusion, I rewrite the question".*

The results of the work of the SSB subject for question number 2 clearly the subject solved the given problem and the SSB subject was able to conclude the question correctly but the subject did not complete his work by sketching and the subject seemed to understand the problem so that the subject immediately answered without using the mathematical completion process based on mathematical literacy indicators .

In Figure 6, the SSC subject with moderate learning independence is solving problem number 3 correctly and the subject is able to use mathematical symbols correctly, write complete conclusions and the SSC subject fluently answers in full, which is known in the following interview excerpt.

Researcher : *"Are you sure what you answered and wrote down was complete and what was the conclusion?"*

SSC : *"I'm sure you're right, sir, the conclusion is because the government has prepared IDR 2,000,000 from the proceeds of 2,030,000, so the funds are not enough to build roads"*

The results of the work and excerpts from the interview show that the subject of SSC solves the problem correctly and concludes the problem correctly and the subject is able to sketch a garden that is shaped like a rhombus.

Based on the test results and the results of interviews conducted by researchers to subjects with moderate learning independence who were able to complete the three items of the mathematical literacy ability test correctly but were incomplete in explaining the completion steps and in questions number 1 and 2 the subject did not include pictures as a reference for meet the indicators of Communication, Representation Mathematizing, Using Symbols, Devising Strategies, Using Mathematics Tool and Reason and Argument.

3.3 Mathematical Literacy for Low Self Regulated Learning

Subjects with low learning independence were able to complete three questions on the mathematical literacy ability test which contained mathematical literacy indicators Communication, Representation, Mathematizing, Using Symbols, Devising Strategies, Using Mathematics Tool and Reason and Argument. Subjects are able to complete the questions on time and are able to answer some of the available questions. The results of the work of the subject of learning independence are low in the following picture.

Figure 7 result of question number 1 subject SRA

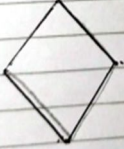**Figure 8 results of question number 2 subject SRB**

Figure 9 the results of question number 3 subject SRC

Figure 7 SRA subjects with low learning independence on question number 1 the subject is able to answer the question but in the process of completing the subject the subject has not finished solving the problem correctly. The following is an excerpt from an interview with the subject of SRA.

Researcher   : *""Based on the mathematical model that you have made, it relates roughly to what concepts and conclusions from question number 1 are like, Tell me about your work!".*

SRA   : *"The concept of a rectangular area, sir. (subject is silent and stares at his work)*

The SRA subject understands the concept but when working on the subject has not been completed and from the results of work and interviews it appears that the subject understands the problem given but the subject lacks accuracy in the completion process. In Figure 8, the subject of SRB with moderate learning independence clearly understands the problem given by the researcher, but the subject is less careful in solving the problem, as can be seen in the excerpt of the interview with the SRB subject.

Researcher   : *" From the solutions you made, what are the conclusions?"*

SRB   :*" can you read the question sir? So I multiplied the area of the field by the price, sir, the total cost needed to install the futsal field barrier is two million five hundred rupiah."*

The results of the work and interviews showed that the SRB subject in solving question number 2 was able to answer but was not careful, causing errors in the final results. Figure 9 the work of the SRC subject with low learning independence in solving question number 3, the SRC subject cannot answer the question on the question but the subject's answer is able to sketch a rhombus. The following is an excerpt from the SRC subject interview.

Researcher : *"How are the questions on the known questions and become the problems in the questions?"*

SRC   : *"(The subject is silent).. Actually I am confused, sir, how to do it, what I wrote was only known and asked and I can only sketch, sir".*

The results of the work of the SRC subject are supported by interview quotes, it appears that the subject does not understand the concepts that will be used in the settlement.

The results of the work and interviews of subjects with low learning independence can work on questions number 1 and 2 correctly and the subject understands the concept in completion but the subject is not careful enough to cause errors while in question number 3 the subject of low learning independence does not understand the concept so that he is able to do as much as possible by writing down known to be asked and the subject's answer is able to sketch a rhombus-shaped garden. This shows that the subject of low learning independence achieves four mathematical indicators in the form of mathematics Communication, Representation, Mathematizing, Using Symbols. Based on the results of the study, information was obtained that in most of the problems involving the use of mathematical literacy, students with low learning independence could express their mathematical ideas in written form, although they were incomplete.

4. Conclusion

Based on the results of subject work analysis and interviews described above, as well as interviews with their mathematics teachers, it can be said that students' literacy skills are quite good. Students with high learning independence are able to solve and solve problems with complete and coherent steps (devising strategies). Students are able to design and implement strategies to find

mathematical solutions.. On indicators of conclusion (reasoning and argument) students are able to explain correctly and completely. Students are able to reflect and argue with reasonable reasons. Students with moderate learning independence are able to solve problems properly and correctly and students with moderate independence are able to conclude the three questions, but from the three questions given, it appears that the subject is still lacking in sketching on questions number 1 and 2 on question number 3, the subject solves the problem. completely and able to contain indicators of mathematical literacy Communication, Representation, Mathematizing, Using Symbols, Devising Strategies, Using Mathematics Tool and Reason and Argument. Subjects with low learning independence are still not sufficient in implementing mathematical literacy indicators, it appears that subjects with low learning independence can only achieve four indicators of mathematical literacy in the form of Communication, Representation, Mathematizing, Using Symbols,

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