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Mathematics Literacy Skill Seen from *Self-Regulated Learning* (SRL) in SQ4R Learning with Mathematics Realistic Approach

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Abstract

This research aimed to describe mathematics literacy sill seen from SRL at students categorized high, moderate, and poor. This research was done at VII grade of SMP Negeri 13 Semarang in academic year 2018/2019. This *mix method* research used *sequential explanatory* strategy. It is a procedure to collect quantitative and qualitative data respectively. The findings showed that mathematics literacy skill of the students on each category had different indicator of mastery and when it was seen from SRL. The differences were due to they had various developments. Therefore, the learning implementation should be in line with understanding which could be achieved by students and there was a need of self-regulation of students which were supported by environment.

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INTRODUCTION

One of indicators showing education quality of Indonesia is poor level of international achievement result dealing with students' achievements, such as Survey Trends International Mathematics and Science Study (TIMSS) and Programme for International Student Assessment (PISA). The focus of PISA is literacy which emphasizes on skills and competencies of students obtained from schools and could be used in daily life into various situations (Stacey, 2012). The Ontario Ministry of Education (2004) stated that mathematics literacy is a requirement to achieve life success because it will allow an individual to take accurate choice in his life and productively participates in society.

Mathematics literacy also has aligning components to 21st century skill such as critical and problem solving, communication and collaboration, and creativity and innovation which are needed to answer and solve the current era challenges (Anwar et al, 2019). Accordin to Wardono (2013), teachers are suggested to always create in using more innovative learning and helps to socialize in introducing assessment based on PISA. The result of mathematics literacy will be great when during mathematics learning development, teacher could adjust the used learning method (Syawahid & Putrawangsa, 2017).

Mathematics literacy is one of skills to improve from cognitive perspective. Beside cognitive aspect, teacher should also develop and improve the affective aspect. The affective aspect psychologically also contributes to improve cognitive aspect of students (Bell and Pepp, 2014). One of affective aspects contributing to cognitive development is Self-Reulated Learning (SRL). SRL is known as learning independency. It is a factor to determine success of mathematics learning for students (Sumarmo, 2004). Fisher & Baird (2005) stated that SRL in mathematics involved conscious development about how to use their own thought to select problem solving strategy.

Meiliati, et al (2018) also revealed that SRL in learnin is ability to manage personal learning without being depended on other people. Students with better SRL will be motivated to achieve optimal result.

Hadin, et al. (2018) revealed that SRL could combine academic and and self-regulation of an individual to be more motivated to achieve his personal learning purpose independently.

In this research, the used learning was to improve mathematics literacy skill. It was done by having Survey, Question, Read, Recite, Reflect, Review (SQ4R) through realistic approach. The learning consisted of vocabulary mastery, material organization, and fact connection (Rustina, 2014). Furthermore, SQ4R is initiated by developing general description toward the learnt material to trigger question from learners and to seek the answers by themselves (Silviani, 2018). According to Doolittle, et al. (2006) SQ4R is a solution for poor reading comprehensive skill problem. Ibrahim et al (2018) revealed that SQ4R could be an alternative to make students active and independent. Baqar & Gurbuz (2017) revealed that SQ4R succeeded in contributing to learners' reading understanding. Sturgeon (2018) also showed that SQ4R strategies have several stages which are easy to follow and to understand.

Jaeng (2009) in Andriani (2014) stated that realistic mathematics learning is opposite to contextual problems, from the contextual problems, learners discuss the mathematics problem. Then, they solve it mathematically. Hawa (2014) and Nurdianasari et al (2015) stated that there are two factors causing poor mathematics literacy, one of them is the learning approach so it needs realistic approach to improve mathematics literacy. Furthermore, by having mathematics literacy approach, students will be more independent in learning mathematics (Haji & Abdullah, 2015). Wati et al (2015) revealed that learners would easily understand the learnt material because they use real daily life problems. Khaerunisak et al (2017) stated that realistic mathematics education is effective to improve mathematics literacy skill. Sudianto (2019) also stated that learning model focusin on learners would make them improved. In this case, such learning could be done by realistic approach. Thus, SQ4R learning with realistic approach was expected to improve mathematics literacy skill and SRL of the students.

The problem formulations in this research were: (1) how was the effectiveness of mathematics literacy skill on SQ4R learning with realistic approach and (2) how was the description of mathematics literacy skill seen from SRL on SQ4R

learning with realistic approach categories: high, moderate, and poor.

METHOD

This mixed method research involved both quantitative and qualitative data collection followed by philosophical assumption and theoretical framework. The used strategy in this research was sequential explanatory (Creswell, 2016). Creswell & Clark (2007) in Creswell (2016) stated that sequential explanatory is a data collection strategy procedure for both quantitative and qualitative data done respectively. It prioritizes quantitative data than qualitative data.

This research was done at SMP Negeri 13 Semarang in academic year 2018/2019. The population consisted of six classes at VIII grade. The sample was taken randomly, resulted to VIII G class as experimental group and VIII H as control group. The subjects consisted of each learners as subjects of mathematics literacy skill and SRL.

The quantitative data collection was done by test and inventory. The mathematics literacy skill test was developed into essay consisting of 5 questions. It was created by considering process components (formulate, employ, and interpret), content and context, and mathematics literacy assessment framework. The SRL inventory consisted of nine indicators with 30 questions. The quantitative data analysis was done by normality and homogeneity test to determine the hypothesis test. The hypothesis test used t-test and z-test.

The qualitative data used documentation, interview, and observation toward selected subjects. The qualitative data used Miles and Huberman's argument (1984). It was done by (1) data reduction, (2) data display, and (3) concluding.

FINDING AND DISCUSSION

The initial skill results of mathematical literacy and (SRL) learners produce Actual Completion Limit (BTA) which was calculated using the formula $BTA = \bar{X} + \frac{1}{4}\ SD$ with $\bar{X}$ was the class average value and SD was the standard deviation (Sudjana, 2009). The use of SRL inventory data results from ordinal scale needed to be changed to interval scale with the method of successive interval (MSI), because the statistical tests on hypothesis testing require data to be interval scale (Sarwono, 2013). The BTA for mathematics literacy skill was 68 with $\bar{X} = 66{,}03$ and SD = 8,75.

The effectiveness of mathematics literacy skills in SQ4R learning with a realistic mathematical approach, seen from: (1) the average value of students' literacy skill tests in SQ4R learning with a realistic approach to achieve BTA mathematics literacy; (2) the proportion of students' mathematical literacy skill in SQ4R learning with a realistic approach of at least 75% of all students achieving BTA mathematics literacy; (3) the skill of mathematics literacy in SQ4R learning with a realistic approach is better than PBL learning. The effectiveness of mathematical literacy skill in SQ4R learning with this realistic approach fulfil the effective criteria set by the results of data processing tested with the left side, namely (1) the average completeness of the experimental class showed that $t_{count} \geq t_{table}$, ie $1{,}163 \geq -1{,}70$, then H_0 is accepted, which means that at the 95% confidence level, a hypothesis stating that the average literacy skill of students is more than equal to 68 was acceptable, (2) the results of the proportion of mathematical literacy abilities showed that $z_{count} \geq -z_{tabel}$, that was $0.594 \geq -1{,}736$, then H_0 was accepted, which means at the 95% confidence level, the hypothesis which stated that the proportion of students' mathematical literacy skill in SQ4R learning with a realistic approach of at least 75% of all students achieving BTA mathematical literacy was acceptable, and (3) the result of the difference in the average mathematical literacy skill showed that$t_{count} \geq t_{table}$, that was $3{,}084 \geq -1{,}996$, then H_o was accepted, which means at the 95% confidence level, the hypothesis which stated that the skill of mathematical literacy in SQ4R learning with a realistic approach was better than PBL learning could be accepted. This was in line with the opinion of Arhasy, et al. (2015) that SQ4R learning with a realistic approach will improve learning outcomes compared to learning that does not apply SQ 4R with a realistic approach.

Qualitative analysis in this study, the results of literacy skill tests in the form of students' answer sheets and SRL student inventory results were

categorized in high, medium, and poor categories. The determination of this category is based on the determination by Azwar (2016), namely by finding the poorest value and the highest value which was the ideal mean, and the standard deviation with the following formula.

$$\text{mean ideal} = \frac{1}{2} \times (\text{max score} + \text{min score})$$

$$\text{standar deviation} = \frac{1}{6} \times (\text{max score} - \text{min score})$$

Mathematics Literacy Categories (KLM) and SRL results could be seen in Table 1 and Table 2 below.

Tabel 1. KLM Categorization

Interval	Category
$X \geq 76{,}33$	High
$60{,}67 < X < 76{,}33$	Medium
$X \leq 60{,}67$	Poor

Tabel 2. SRL Categorization

Interval	Category
$X \geq 71{,}65$	High
$57{,}02 < X < 71{,}65$	Medium
$X \leq 57{,}02$	Poor

Based on these results the percentage obtained for each category of KLM and SRL was shown in Figure 1 below.

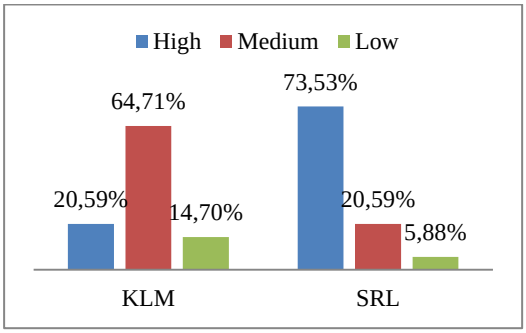

Figure 1. KLM and SRL percentage category

Figure 1 showed that the KLM of 34 students, in the moderate category more than the high and poor categories, that was equal to 64.71% as many as 22 students and categories of high and poor respectively 20.59% and 14.70% with many students in a row were seven and five students. In SRL with the same number of students, the achievement of the high category was 25 students, seven students were moderate, and two students with poor consecutive percentages were 73.53%, 20.59%, and 5.88%.

These results indicate that students with high KLM were fewer than students who have high SRL, students with moderate KLM were more than students with moderate SRL, so also students with poor KLM categories have more percentages than participants students with poor SRL. This showed that students with high KLM might not necessarily had high SRL, and vice versa.

SQ4R learning with the realistic approach in this study showed that the results of the KLM test data analysis on the learning showed that in general students with high categories were able to master the components of mathematical literacy skill well. Problems related to the real context make it easy for students to imagine the problems faced. This was in line with Mulyono & Lestari (2016) who revealed that with a contextual approach, students could develop KLM at the employing and interpreting stages. Baqar & Gurbuz (2017) also revealed that students who implemented SQ4R were more successful in reading comprehension which contributed to students' reading skills and understanding. Some students in the high category were also still difficult in designing problem solving strategies because they were not familiar with math literacy problems, this was in line with the research of Novalia & Rochmad (2017) which also revealed that students with high literacy skills were still familiar with problems whose procedural answers were concrete. In general, KLM indicators mastery of high category students was the least mastered, namely indicators designing strategies to solve problems. As for students who have KLM in the medium category could master a number of indicators well, the rest were still lacking in terms of mastering these indicators.

In general, mathematical literacy skill indicators controlled by most students were representation, then followed by the use of mathematical tools, communication, mathematics, designing strategies to solve problems, reasoning and argumentation, and finally the use of formal language and mathematical symbols, this in line with the

results of the research Haerunisah, et al. (2019) which also revealed that reasoning and argument were still very difficult for students to do. In line with this, Prabawati (2018) revealed that subjects with moderate literacy skills were able to meet several indicators well, only the subjects were less able to express reasons and views that were flexible in the context of the problem. The results of Maharani & Kurniasari's research (2016) also revealed that students in the medium category could understand the problems presented and link their solutions to the real context, but there were still some indicators that were still not mastered. Furthermore, students with poor literacy abilities were still very much lacking in mastering indicators of mathematical literacy abilities. In general, in this study indicators of mathematical literacy skill did not reach 70% controlled by poor category students. Almost all indicators of mathematics literacy skill have not been mastered by students in this category. Oktviyandhi & Agus (2019) who said that students with poor skill had weaknesses in logic, difficulty in transforming story questions into mathematical form, lack of experience working on analytical problems, and habituation factors. Sari & Wijaya's research (2017) also showed that many indicators of literacy skill were not fulfilled by students with poor skill. Research by Khoirudin, et al. (2017) showed that students on this skill could only answer questions that are general and known, and all relevant information was available with clear questions. In general, students mastery indicators in the high category were eight students, moderate were twenty one students, and as poor as five students had varying mastery.

In SRL, students with high SRL categories generally meet the indicators of SRL, it was just that the indicators use and look for relevant sources, there were still students who had not utilized the relevant sources and there were still students who did not really like discussing with group. The results of Pratama's research (2017) revealed that students with a good level of SRL have self-learning initiatives, were organized in learning, were able to solve a problem and could forge themselves into the social environment. Analysis of students with medium category SRL was generally still lacking in diagnosing the need to learn mathematics, and still lack of monitoring, managing, and controlling learning. Hamundu, et al. (2017) from the results of his research stated that students with standard SRL could actively participate and express ideas intensively according to their knowledge and experience. In participants with a poor SRL category, unable to meet the indicators of SRL, almost all the indicators of students showed not achieving the SRL indicators well. Fauziah, et al. (2018) revealed that the poor level of SRL causes students difficulties in solving their problems in learning, leading to behaviour that is not independent in learning. Improving SRL students need the support of the surrounding environment and shared responsibility between educators and those around them, as well as the environment that is not only in school (Yildizli & Saban (2016), Brydges, et al. (2015)). In general, SRL indicator mastery with 25 high category students, seven medium category students, and two poor category students varies greatly. Students with high SRL do not necessarily have high mathematical literacy skills, some even have poor mathematical literacy abilities, as well as moderate and poor SRL categories.

CONCLUSION

The conclusion of this study is that students with high SRL do not necessarily have high literacy skills, and vice versa, because it is a meaningful learning process and arrangements from within students that are supported by the surrounding environment that will provide a good effect on the skill of mathematical literacy and SRL participants students.

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