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To cite this article: M Wesna *et al* 2021 *J. Phys.: Conf. Ser.* **1918** 042040

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# Mathematical literacy ability in terms of the independent learning students on reciprocal teaching learning models with approaching RME assisted by google classroom

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**Abstract.** The aim of this study is to determine the quality of the learning reciprocal teaching with approaching RME assisted by google classroom on mathematical literacy ability and describe mathematical literacy ability in terms of the independent learning students. This study uses a mixed-method. Subjects of this study were 8<sup>th</sup> grade students of SMPN 7 Pontianak 2019/2020 school year. The subject of the study was based on the categories high independent learning, middle independent learning, and low independent learning. The results showed that the quality of reciprocal teaching-learning with the RME approach assisted by google classroom both qualitatively and quantitatively. Reciprocal teaching-learning of the planning and implementation categories included either. In the assessment phase, the ability of a mathematical literacy of reciprocal teaching achieve mastery learning and increasing categories included medium. Students in high independent learning can use all the indicators of mathematical literacy to the maximum. Students in the middle independent learning were able to use all indicators of mathematical literacy in a relatively long time. Students in the low independent learning enough in using indicators of mathematical literacy.

## 1. Introduction

The ability that students need and must have in learning mathematics is literacy ability. The ability of individuals to communicate and explain phenomena that describe mathematical concepts is prioritized in mathematical literacy. The results of the PISA study in 2018 were just released and Indonesia's PISA ranking fell in 2015 to 62 and to 67 in 2018. Based on the results of the PISA study, it shows that the literacy ability of Indonesian students is still low compared to other countries. Literacy in learning mathematics is a standard that must be mastered by students to develop and improve the competence of students' math skills [1]. Ability in mathematical literacy involves seven basic abilities that must be possessed by students [2], namely: (1) Communication, (2) Mathematising, (3) Representation, (4) Reasoning and Argument, (5) Devising strategies for solving a problem, (6) Using symbolic, formal and technical language and operation, dan (7) Using mathematical tools. A person is said to have a good level of mathematical literacy if someone is able to analyze, reason, and communicate their mathematical knowledge and skills effectively, and is able to solve and interpret mathematical solutions. Stacey [3] states that mathematical literacy in PISA focuses on students' ability to analyze, provide reasons, and convey ideas effectively, formulate, solve, and interpret mathematical problems in various forms and situations.



The ability of each individual in learning is certainly very different, for this reason, teachers need to understand the needs of each student and understand how the learning process is by the student's condition. The need for independent learning, especially for individuals who learn mathematics, is supported by the results of studies such as [4] that individuals who have high learning independence tend to learn better, can monitor, evaluate and organize their learning effectively, save time in completing tasks, manage time efficiently and get a high score.

Independence in learning refers to learning that occurs mainly from the influence of the thoughts, feelings, strategies, and behaviors produced by students, which are oriented towards achieving goals. Schunk and Zimmerman describe independence in learning as individuals who are actively involved in the learning environment, organize training, and use their abilities effectively, and have positive motivational beliefs about their abilities in learning [5].

Independence learning can be improved through the reciprocal teaching-learning model. According to [6], one of the learning models that can improve student learning independence is using reciprocal teaching. According to [7] there are four important steps in reciprocal teaching: (a) Direct learning strategies; (b) Using knowledge to solve problems; (c) Guidance from the teacher; (c) Peer tutoring strategy. Reciprocal teaching can train students in presenting their ideas because their learning orientation is investigation and discovery. Through finding and investigating the concepts that are being studied on their own, students will find it easier to remember a concept. This is the same with [8] which states that reciprocal teaching encourages students to play a more active role in group dialogue and helps students on a personal and cognitive level in understanding the subject matter. Reciprocal teaching is carried out in groups with key activities, namely: questioning, clarifying, predicting, and summarizing. The mathematics learning approach that is by the Indonesian curriculum as well as in line with the objectives of PISA is Realistics Mathematics Education (RME). RME or realistic mathematics learning is a mathematics learning approach that uses contextual problems as the first step in the learning process.

## 2. Methods

This type of research is mixed methods research. Subjects of this study were 8<sup>th</sup> grade students of SMPN 7 Pontianak 2019/2020 school year. The research subjects were based on the categories of high independent learning, middle independent learning, and low independent learning. There are two stages of research where the research begins with a preliminary study in order to identify problems in the field by conducting studies on data, interviews with teachers, and studies on the literature. In stage two, the researcher conducts quantitative and qualitative research together in research activity. In its application, the reciprocal teaching model will be assisted by the RME approach and google classroom as a means of interaction between students and teachers in the implementation of learning in the classroom. The quality of reciprocal teaching-learning qualitatively is seen from the results of the validation of research tools and instruments, the results of quality observations, and the implementation of learning. The quality of reciprocal teaching-learning quantitatively includes the z test and gain test. Meanwhile, students' mathematical literacy skills based on independent learning were analyzed descriptively based on document test results and interviews with student representatives so that it could be concluded that students' mathematical literacy skills were based on the dimensions of independent learning.

## 3. Results and Discussion

The mathematical literacy skills to be studied have 25 students. Based on the results of the analysis on the independent learning questionnaire, the following student data were obtained and are listed in Table 1.

**Table 1.** Student Grouping in terms of Independent Learning

Characteristics of Independent Learning	Number of Students	Percentage
High Independent Learning	6	24%
Middle Independent Learning	16	64%
Low Independent Learning	3	12%
<b>Total</b>	<b>25</b>	<b>100%</b>

Based on table 1, we can see six students with high independent learning, 16 students with middle independent learning, and three students with low independent learning. Students with middle independent learning dominate students with high independent learning and students with low independent learning. The low category student selection was obtained from 2 students with the lowest independent learning score. The selection of students in the medium category was obtained from 2 students with middle independent learning scores. And the high category student selection was obtained from 2 students with the highest independent learning score. This was done to significantly differentiate students from the three categories in solving problems related to mathematical literacy.

The quality of learning is qualitatively assessed from 2 stages. The first stage is planning where the researcher prepares a research instrument which is then validated by the expert. In the second stage, namely the implementation stage, the observer observes the quality and implementation of learning. The following are the results of the acquisition of the assessment of learning device assessment instruments, the results of observations of the quality of learning, and the results of observations of learning implementation shown in table 2, table 3, and table 4.

**Table 2.** Results of Learning Media Assessment

Media	Average Score of the Validator			Total Average	Category
	V001	V002	V003		
Syllabus	3.80	3.70	3.80	3.76	Well
Lesson Plans	3.60	3.80	3.75	3.71	Well
Student Book	3.76	3.86	3.80	3.80	Well
Worksheets	3.80	3.87	3.86	3.84	Well

**Table 3.** Results of Learning Quality Observations

No.	Quality of learning	Average Score Indicator		Total Average	Category
		P001	P002		
1.	Meeting 1	3.80	3.80	3.80	Well
2.	Meeting 2	3.85	3.80	3.82	Well
3.	Meeting 3	3.70	3.80	3.60	Well
4.	Meeting 4	3.85	3.75	3.75	Well

**Table 4.** Results of Learning Implementation Observation

No.	Implementation	Average Score Indicator		Total Average	Category
		P001	P002		
1.	Meeting 1	3.63	3.85	3.74	Well
2.	Meeting 2	3.80	3.78	3.79	Well
3.	Meeting 3	3.80	3.85	3.82	Well
4.	Meeting 4	3.85	3.90	3.87	Well

Based on the results of the assessment of learning devices by expert validators, it was found that the average assessment of the expert validators was in a good category. This means that learning tools are suitable for use in research. The average result of observing the quality of learning during the four meetings is in good criteria. The average results of observations of the implementation of learning during four meetings were in the excellent category. This means that the researcher has carried out the learning well. The quality of learning is quantitatively determined based on the classical completeness test and the normalized gain test. The data used for the mastery test and gain test results from the students' pretest and posttest. The results of the pretest and posttest of the experimental class students can be seen in table 5.

**Table 5.** Results of TKLM Pretest and Posttest Experiment Class

	<b>Pretest Average</b>	<b>Posttest Average</b>
Experiment Class	62,75	79,68

Based on the calculation of learning completeness in the experimental class using the right side proportion test, it is obtained  $Z_{hitung} = 2.46$ , whereas  $Z_{tabel} = 1.64$ . The test criterion is rejected  $H_0$  if  $Z_{hitung} > Z_{tabel}$  [7]. Because the value of  $Z_{hitung} = 2.46 > 1.64 = Z_{tabel}$  then  $H_0$  is rejected. This means that the proportion of students in reciprocal teaching-learning who achieved 75 completeness has exceeded 75%. Based on the experimental class gain test obtained  $(g) = 0.61$ . This shows that the value  $(g)$  lies in the range  $0.6 \leq (g) < 0.7$ , so the normalized gain is in the medium category. This means that the students' mathematical literacy skills in the experimental class with reciprocal teaching increased in the moderate category. Based on the description above, the quality of learning in the reciprocal teaching model is quality. This is indicated by (1) the results of the assessment of the device by the expert validator fall into good criteria; (2) the results of the observation of the quality and implementation of learning are in good criteria; (3) the proportion of students who achieved completeness exceeds 75%; and (4) the students' mathematical literacy skills in the experimental class increased in the moderate category. The research results [10] of students who study with the student facilitation model and explaining after controlling the initial ability to determine which group is higher can be seen from the average value while corrected the two groups. In the group of students who study with the reciprocal teaching model, the average mathematics learning outcomes are corrected by 64.71 while the group of students who study with the student facilitation and explaining model is 59.29. The calculation results show that the mathematics learning outcomes between groups of students who study with the reciprocal teaching model are higher than the group of students who study with the student facilitation model and explaining after controlling the initial ability. The research results [11] PBL model with PMRI approach assisted E-learning Edmodo to improve the mathematics literacy ability class VII Junior High School 19, Semarang can be summarized as follows. (1) the average mathematics literacy ability of students in the group PBL models with PMRI approach assisted E-learning Edmodo better than average mathematics literacy ability of students in the group PBL models with PMRI approach and better than average mathematics literacy ability students in the group expository model; (2) The ability of the mathematical literacy of students of class VII junior High School 19, Semarang in the class using the PBL model with PMRI approach assisted E-learning Edmodo has improved and improvement of mathematics literacy ability is higher than the improvement class that uses the model of PBL learning with PMRI approach and is higher than the improvement class that uses expository models; [12] The results of the study are (1) the mathematical literacy ability of students in the experimental group 1 is better than the mathematical literacy ability of students in the experimental group 2 and control group, (2) there is no difference in the mathematical literacy ability between learning styles, (3) there is no interaction between the mathematical literacy ability based learning models and student's learning styles, and (4) the increase of students' mathematical literacy ability in the experimental group 1 is better than in the control group but less than the increase of students' mathematical literacy ability in the experimental group 2.

#### 4. Conclusion

The results showed that the quality of reciprocal teaching-learning on the mathematics literacy ability of grade 8<sup>th</sup> students was qualitatively included in the good category. It was concluded that the higher the student's learning independence, the higher the student's learning independence, and the lower the student's learning independence, the lower the student's mathematical literacy ability. This is indicated by the following. (a) The average value of the syllabus, lesson plans, student books, and worksheets is in a good category. Whereas in the test the TKLM questions were said to be reliable and four of the eight questions could be used for research. From these results it can be concluded that the quality of mathematics learning preparation using the reciprocal teaching model; (b) The average assessment of the learning quality sheet from the first meeting to the fourth meeting is in the minimal good category. Meanwhile, quantitatively, the reciprocal teaching model of learning on the mathematics literacy skills of grade 8<sup>th</sup> students can be said to be of high quality. This is indicated by (a) The proportion of students in the experimental class who achieved a completeness score of 75 has exceeded 75%; (b) Students' mathematical literacy ability in reciprocal teaching increased in the medium category. Students with high independent learning categories can use all indicators of mathematical literacy abilities to the maximum. They can express their mathematical ideas in the form of mathematical literacy to find solutions to given problems. Students with middle learning independent learning can use several indicators of mathematical literacy for a relatively long time, even though overall they can still use their literacy abilities to the maximum.

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