

Mathematics Literature Analysis of Students of Class VIII MTs Darussalam Daun in Cooperative Learning Model Type Investigation Group

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Abstract

This study aims to determine the extent of mathematical literacy skills by applying the Group Investigation type of cooperative learning model. Mathematics literacy achievement in Indonesia is still low, as seen in the PISA and TIMSS surveys, and one of the private junior high schools in Malang learning mathematics is still using conventional learning. The research method is qualitative research with a descriptive approach with nine students as the subject. The results showed that observations of teacher activities at the first meeting were 91.6% very good and the second meeting 97% very good too, observation of student activities at the first meeting 87.5% was very good and the second meeting 93.8% with very good predicates. Then the data from the student response questionnaire on the application of the GI model is an average of 4, 1, which has a good predicate. In addition, the results of the essay test to measure students' literacy skills in the application of the GI model for two meetings showed poor results at the first meeting because there were 2 students who had moderate percentage predicate, while the mathematical literacy ability of students in the second meeting was better because 7 out of 9 students with very high predicate and others with a high predicate. The data obtained based on the results of observations of teacher and student activities, student response questionnaires, and essay test results indicate that the mathematical literacy of Class VIII MTs Darussalam Daun students in the application of the Group Investigation type cooperative model has been successful and effective so that students' mathematical literacy skills are better than meeting First because most students get a very high predicate.

Keywords: Mathematical Literacy; Learning Model; Group Investigation

INTRODUCTION

Simply put, mathematical literacy is the ability to know and use mathematics in everyday life. However, many writers have developed the meaning of mathematical literacy. One of them, according to Ojose (2011) Mathematical literacy involves more implementation methods. It demonstrates basic knowledge, ability, and confidence in using mathematical knowledge in everyday life. According to (OECD, 2017b) Mathematical literacy is an individual's ability to formulate, apply, and interpret mathematics in various contexts. Includes mathematical reasoning and the ability to use mathematical concepts, procedures, facts, and tools to describe, explain, and predict phenomena. However, the achievement of mathematical literacy in Indonesia is still low as seen in the PISA survey (Pakpahan, 2017).

The mathematical literacy achievement of Indonesian students has not shown satisfactory results as seen from their participation in TIMSS and PISA. according to Wardono & Mariani (2014) a survey from Trends in International Mathematics and Sciences Study (TIMSS) Indonesia is ranked 34th out of 45 countries. The Program for International Student Assessment (PISA) shows that Indonesia's achievement in mathematics has increased from 375 points in 2012 to 386 points in 2015. This increased achievement has made Indonesia ranked 63 out of 70 countries. (Tasyanti et al., 2018). However, this achievement still shows that mathematical literacy in Indonesia is still low. As shown Tasyanti, Wardono, and Rochmad (2018) Indonesian students have not been trained and accustomed to PISA questions that require mathematical literacy to solve them. Though according to (Wardono & Mariani, 2014) the definition of mathematical literacy based on PISA 2015 is in line with the standard content of mathematics subjects in the Indonesian curriculum. Although the Indonesian curriculum is in line with the definition of mathematical literacy based on PISA 2015 which includes three abilities (formulating, applying, and interpreting mathematics), if the curriculum implementers (teachers) are not in line, then it is useless to align the Indonesian curriculum with the definition of mathematical literacy. Most students also do not understand the content of the material if it is not explained in advance by the teacher. As in one of the private high schools in Malang, mathematics learning is still carried out using conventional learning, namely only with the lecture method, question and answer, and giving assignments that make students feel bored and tend not to listen to explanations from their teachers.

Therefore, learning mathematics in Indonesia is expected to improve mathematical literacy by applying a student center approach, namely the cooperative learning model. The cooperative learning model is a group learning model that focuses students in the learning process, which requires students to be more active and able to work together with group members. (Hartoto, 2016). One of the cooperative models applied is the Group Investigation type of cooperative learning model. The Group Investigation type of cooperative learning model was developed by Sharan-Sharan in 1976 (Hija et al., 2016), what the researcher means is learning the discussion system with one class divided into small groups (4-5 people) with the group leader taking a sub-material lottery because each group gets a different sub-material. Then the group leader and members discuss about the sub-materials obtained. After that, the group leader or other group representatives present or explain their respective sub-materials in front of other groups. Finally, the teacher as a learning supervisor concludes the results of the meeting obtained. The Group Investigation model emphasizes the participation and activity of students in finding information on their own with existing materials and requires them to be active in communicating with the group. (Siti Khoirunisyah, Eko Purwanti, 2017).

Research result Hija, Nirawati, and Prihatiningtyas (2016) show that the mathematical problem solving ability of class students who are given a learning model that is given a GI model learning is better than a class that is given conventional learning. Other research was also conducted by Kusniati (2018)

mentions that the aspects of formulating and implementing aspects of students have not been able to, but can interpret well judging by the results of the tests given.

Based on the explanation above, namely the achievement of mathematical literacy is still low and many students do not understand mathematics learning with mathematical literacy which includes three abilities (formulating, applying, and interpreting) mathematics in various contexts, researchers want to conduct research to find out how mathematical literacy with the application of the Group Investigation (GI) cooperative learning model in Class VIII MTs Darussalam Daun. The research was conducted by observing students while discussing with their classmates. Therefore, the researcher wants to conduct a study with the title "Analysis of Mathematical Literacy of Students of MTs Darussalam Daun in a Group Investigation Type Learning Model". Therefore, the formulation of the problem in this study is how mathematical literacy in students is applied to the Group Investigation (GI) type of cooperative learning model in teaching and learning in the classroom. The purpose of the study is to determine the extent of mathematical literacy skills with the implementation of the Group Investigation (GI) type of cooperative learning model.

RESEARCH METHOD

This research is a descriptive qualitative research. The subjects in this study were 9 students of class VIII MTs Darussalam Daun. The instruments used in this research are teacher activity observation sheets, student activity observation sheets and student response questionnaire sheets and essay test sheets that have been tested for validation by expert lecturers. Data collection techniques used during the study were observation, questionnaires, and tests. The activity observed by the researcher in the study was to observe and understand the teaching and learning activities of teachers and students by applying the Group Investigation type of cooperative learning model to see how teachers teach according to the steps of the GI learning model and the indicators in the observation sheet. Questionnaires will be distributed to each student in class X MIA 2 at the end of the mathematics teaching and learning activity which is used to obtain data from students regarding what has been received when participating in teaching and learning activities that have been carried out with the teacher by applying the Group Investigation type cooperative learning model. Meanwhile, the test is used to see the students' mathematical literacy skills, consisting of 5 essay questions given after the students' discussion. Data analysis techniques using Miles and Huberman's flow model data analysis in analyzing data has the following stages: (Suliah, 2019):

a. Data reduction

The data obtained from the teacher and student activity observation sheets, student response questionnaire sheets, and essay tests were analyzed using the percentage descriptive statistical formula, namely (Fahrunnisa, 2016):

a) Teacher and Students activity observation data

$$P_1 = \frac{R}{X} \times 100\%$$

with,

P_1 = Percentage of teacher observation scores sought

R = Total score obtained
 X = Maximum score
100% = Fixed number

After obtaining the results, the percentages were matched with the assessment guidelines. According to Ngalim Purwanto in Fahrurnisa (2016) teacher activity criteria are based on the following guidelines:

Table 1. Criteria for Teacher and Student Activities

Percentage	Letter Value	Weight	Predicate
86% – 100%	A	4	Very good
76% – 85%	B	3	Well
60% – 75%	C	2	Enough
55% – 59%	D	1	Not good
00% – 54%	E	0	Not good

Teacher activities are said to be effective if the minimum percentage obtained has a good predicate.

- b) Student response questionnaire data
The student response questionnaire consists of five answer choices with the assessment categories in Table 11(Widoyoko, 2010).

Table 2. Assessment Criteria 5 Scale

Category	Score	
	Negative Statement	Positive Statement
Strongly agree (SS)	1	5
Agree (S)	2	4
Disagree (KS)	3	3
Disagree (TS)	4	2
Strongly disagree	5	1

The steps to get the results of the questionnaire analysis:

- 1) Calculate the average score of each and entire questionnaire with the following formula:

$$\bar{x} = \frac{\sum_{i=1}^n x_i}{n}$$

Information:

\bar{x} : the average score of each questionnaire

n : lots of statement items

x_i : score on the item prtstatement to- i

- 2) Converting the average score of the questionnaire into a qualitative value based on the 5-scale assessment criteria according to(Widoyoko, 2010) and can be categorized as follows:

Table 3. Criteria for Student Response Questionnaires

Score Range	Criteria
$\bar{X} > 4,2$	Very good
$3,4 < \bar{X} \leq 4,2$	Well
$2,6 < \bar{X} \leq 3,4$	Pretty good
$1,8 < \bar{X} \leq 2,6$	Not good
$\bar{X} \leq 1,8$	Not very good

The GI type of cooperative learning model is said to be effective if the average student response questionnaire at least the percentage obtained has good criteria.

c) Test Data

The data from the essay test results were analyzed using descriptive statistics and then scored using the following formula:

$$P_3 = \frac{\text{Skor mentah}}{\text{Skor maksimal}} \times 100\%$$

with, Percentage of test scores sought :

Skor mentah = scores obtained by students

Skor maksimal = the maximum score of the guidelines

100% = Fixed number

After that, the percentage value was obtained and analyzed into the following criteria for mathematical literacy abilities.

Table 4. Criteria for Mathematical Literacy Ability

Level of success (%)	Criteria
> 80%	Very high
60 – 79%	Tall
40 – 59%	Currently
20 – 39%	Low
< 20%	Very low

(Source: Kusniati, 2018)

The successful application of this GI type of learning model is to see the mathematical literacy ability of students if the percentage value of the test obtained is 60% of the subjects have high criteria.

b. Data presentation

Data obtained from observations, questionnaires, and tests are presented in the form of tables and descriptions. The information presented is in accordance with the researcher's focus, namely seeing how mathematical literacy skills are with the implementation of the Group Investigation (GI) type cooperative learning model at MTs Darussalam Daun.

c. Conclusion

After the researcher got the desired data, then the conclusions that had been obtained were drawn using a data measuring device (research instrument) which had been analyzed using the percentage statistical formula to find out the results of this study

RESULTS AND DISCUSSION

The schedule for conducting the research was carried out at the researcher's house due to the pandemic conditions that did not allow schools to hold face-to-face meetings, as follows in Table 5 :

Table 5. Schedule of Group Investigation Type Cooperative Learning Activities

Date and time	Lesson hours	Activity
Tuesday, June 8, 2021	09.00-10.00	Carry out learning with a cooperative model of Group Investigation type and observe teacher activities observed by appointed observers
Thursday, June 10, 2021	08.00-09.00	Continuing the unfinished material and reviewing it again, then at the end of the lesson students are given an essay test and a student response questionnaire is distributed.

Table 6. Results of Observation of Teacher Activities

No.	Learning Activities	Meeting 1	Meeting 2
1.	Preliminary activities	10	11
2.	Core activities	12	12
3.	Closing Activities	11	12
Total score		33	35
Percentage= (score : 36) x 100%		91.6%	97%
Predicate		Very good	Very good

Table 6 shows the results of observations from teacher activities during the learning process. From the results of the learning for teacher activities, it shows the very good category at meeting 1 and meeting 2, namely with a percentage of 91.6% and 97%. It can be said that there was an increase of 5.4%.

Table 7. Results of Observation of Student Activities

No.	Learning Activities	Meeting 1	Meeting 2
1.	Preliminary activities	3	3
2.	Core activities	22	24
3.	Closing Activities	3	3
Total score		28	30
Percentage= (score : 32) x 100%		87.5%	93.8%
Predicate		Very good	Very good

Table 7 shows the results of observations of student activities during the learning process. From the results of the learning for student activities showed the very good category at meeting 1 and meeting 2, namely with a percentage of 87.5% and 93.8%. It can be said that there was an increase of 6.3%.

Table 8. Recapitulation of Student Response Questionnaire Results

No.	Subject	Score	Conversion
1	S1	45	4.1
2	S2	49	4.5
3	S3	46	4.2
4	S4	43	3.9
5	S5	40	3.6
6	S6	49	4.5
7	S7	46	4.2
8	S8	42	3.8
9	S9	44	4.0
Amount		404	36.8
Average (Criteria)		44.9 (Well)	4.1 (Well)

Table 8 is the result of the response questionnaire scores filled out by 9 students. The table shows a good response, thus obtaining good criteria regarding the application of the Group Investigation type cooperative model in measuring students' mathematical literacy skills. Based on the results of the teacher and student observation sheets also experienced an increase with very good criteria. Therefore, the Group Investigation type cooperative model has met the criteria for effectiveness in learning as written in the previous chapter.

Table 9. Recapitulation of First Meeting Essay Test Results

No.	Subject's Initials	Score	Percentage	Predicate
1	S1	19	63.3%	Tall
2	S2	26	86.7%	Very high
3	S3	20	66.7%	Tall
4	S4	19	63.3%	Tall
5	S5	14	46.7%	Currently
6	S6	29	96.7%	Very high
7	S7	27	90%	Very high
8	S8	15	50%	Currently
9	S9	19	63.3%	Tall

Table 9 shows that 3 out of 9 students have a very high percentage predicate, 4 out of 9 students have a high percentage predicate, and 2 out of 9 students have a moderate percentage predicate. This shows that the results of students' essay tests at the first meeting with the application of the GI type cooperative model have not been fully successful in measuring students' mathematical literacy skills, because there are 2 students who have a moderate percentage predicate.

At the second meeting, the results of the essay tests from the nine subjects studied showed that the three aspects of students' mathematical literacy were good and appropriate. Students are able to formulate test questions or existing problems by writing what they know or by drawing. Aspects of applying appropriate concepts, facts, procedures, they are also able to do the same as at the first meeting. Students are also able to interpret mathematical results into the context of the problem in a reasonable way. The results of the percentage of essay test data for the second meeting are in table 10 following.

Table 10. Recapitulation of Essay Test Results for the Second Meeting

No.	Subject's Initials	Score	Percentage	Predicate
1	S1	26	86.7%	Very high
2	S2	27	90%	Very high
3	S3	26	86.7%	Very high
4	S4	19	63.3%	Tall
5	S5	29	96.7%	Very high
6	S6	29	96.7%	Very high
7	S7	27	90%	Very high
8	S8	26	86.7%	Very high
9	S9	24	80%	Tall

Table 10 shows that 7 of 9 students have a very high percentage predicate, 2 out of 9 students have a high percentage predicate, and no students have a medium percentage predicate. This shows that the results of students' essay tests at the second meeting with the application of the GI type cooperative model have been successful and effective in measuring students' mathematical literacy skills, because most students get very high predicates based on essay question scores which are analyzed from 3 aspects, namely:

a. Aspects of Formulating

The answers to the essay test questions at the first and second meetings showed 9 students were able to formulate aspects, namely changing or formulating into mathematical symbols and images that matched the flat side space material. S1 to S9 are able to convert relevant problems into various mathematical forms appropriately. It can be seen that the subject can explain the problems or problems that exist with pictures or symbols. S1, S2, S3, S4, S6, S7, S8 formulate the problem in the form of a flat-sided geometric symbol while S5 and S9 formulate it in the form of a flat-sided figure.

b. Aspects of Applying

In the aspect of applying students are able to understand the given problem by first formulating the problem into a mathematical form that is in accordance with the flat side space material. So that students use concepts, facts, and procedures in solving mathematical problems properly and appropriately. Students can do calculations well even though there are some who get inaccurate answers because they are not careful and in a hurry. At the first meeting the results of the essay test scored 1 out of 2 for the applying aspect, namely all students (S1 to S9) to answer 1 to 2 questions for each student, they were less precise in using appropriate concepts, facts, procedures so that they obtained inaccurate results. . While at the second meeting there was an increase, namely S4, S5, S7,

c. Interpreting Aspect

In the aspect of interpreting, namely concluding a reasonable answer with the right problem and answer, some students did not do it at the first meeting. Most of them do not write conclusions or reinterpret mathematical problems into contextual form. The data from the essay test shows that S1, S4, S5, S8, S9 did not write conclusions from all the number of questions, while S3 did not conclude on questions number 1, 4, 5. There was an increase in the second meeting after the teacher and students evaluated at the first meeting, that is, only S4 was found which did not conclude all the number of questions, but the score obtained was still with high criteria.

Based on the research data obtained, the researcher concludes that the mathematical literacy ability in the Group Investigation type cooperative model is very high in teaching and learning activities. The activities of teachers and students in the GI model have an influence on mathematical literacy skills. This is evidenced by the increasing activities of teachers and students, the increasing ability of students' mathematical literacy on essay test questions. The increase in teacher activities from 91.6% to 97% and student activities from 87.5% to 93.8% resulted in students' mathematical literacy skills. The results of the students' essay tests

which were initially at the first meeting were not fully successful in measuring students' mathematical literacy skills, because there were 2 students who had moderate percentage predicates. Meanwhile, at the second meeting the application of the GI type cooperative model was successful and effective in measuring students' mathematical literacy skills, because most students received very high predicates, namely 7 out of 9 students. The learning process of the Group Investigation type of cooperative model in measuring mathematical literacy skills got a good response from the students. It is proven by the distribution of response questionnaires to students by obtaining an average of 4.1 so that they get the criteria of Good.

The results of the study are strengthened by the research conducted Tasyanti et al. (2018) said the application of the GI model of the mathematical literacy ability of SMA 2 Semarang students in learning was very good as shown from the results of interviews and answers to test questions that students were able to convert real problems into mathematical form, very good criteria for the representation component shown by being able to re-present the problem so that clearer, the criteria are very good for the component planning strategy which is shown by being able to write down the correct completion steps, sequential writing, correct formulas, and correct calculations, and very good criteria for components using mathematical tools in working on problems properly and correctly. . This means that the aspects of formulating, implementing, and interpreting students have good criteria.

Based on the results of observations, questionnaires, and written tests, this study is better than research Kusniati (2018) with the results of the research, students are able to formulate the given problem in the form of symbols and images that are in accordance with the flat-sided wake-up material, apply concepts, facts, and procedures that are appropriate and appropriate. As well as being able to reinterpret mathematical sentences to existing problems. While research belongs to Kusniati (2018) only based on written tests which were conducted three times with the results that students were not fully capable of formulating and applying the problems given. However, students are able to interpret well.

CONCLUSION

Based on research data obtained from observation data on teacher and student activities, student response questionnaires and essay test results indicate that mathematical literacy skills in the Group Investigation type cooperative model have a very high predicate in teaching and learning activities. The students' mathematical literacy ability seen from the results of the essay test was initially not good at the first meeting, because there were 2 students who had a moderate percentage predicate. Meanwhile, at the second meeting the application of the GI type cooperative model was successful and effective so that students' mathematical literacy skills were better than the first meeting, because most students received very high predicates, namely 7 out of 9 students.

To researchers who want to conduct research, this research is only limited to mathematical literacy skills in the GI type cooperative model, for further research it is better to study more broadly with related themes and can correct the weaknesses

in this study, namely when determining the time of the study because The pandemic has caused researchers to be confused about carrying out research because schools have not met face-to-face. Finally, the researcher was desperate to go to the MTs Darussalam Daun school to ask for permission to conduct research and it was agreed with the place at the researcher's house. At the first meeting the students felt awkward and less active in discussing because they were not used to it. So it is better if the application of the learning model is carried out more varied.

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