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## Improving Mathematical Literacy Ability of Elementary School Students through A Field Trip Learning

**Sita Husnul Khotimah\***

\*Department of Basic Education, Postgraduate Program, Universitas Negeri Jakarta  
Email: [sita\\_kh81@yahoo.com](mailto:sita_kh81@yahoo.com)

**Agus Setyo Budi\*\***

\*\*Department of Physics Education, Postgraduate Program, Universitas Negeri Jakarta  
Email: [agussb@unj.ac.id](mailto:agussb@unj.ac.id)

**Mohamad Syarif Sumantri\*\*\***

\*\*\*Department of Basic Education, Postgraduate Program, Universitas Negeri Jakarta  
Email: [syarifsumantri@unj.ac.id](mailto:syarifsumantri@unj.ac.id)

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### Abstract

This study aims to improve the mathematical literacy ability of elementary school students by using field trip in mathematics learning. This research tried to find out the general description of field trip starting from planning, implementation, and evaluation. The object of field trip is adjusted to the mathematical material so that it gives an effect on students' mathematical literacy. The mathematical material used in this study is rounding and scale. The research design used for the trial was One Group Pretest-Posttest Design, by using n-gain test for data analysis. Data collection is done through mathematical literacy tests and observations of student activities. The results showed an increase in mathematical literacy ability through the post-test and pretest. The first post-test obtained an increase of 54.48% and the second post-test 8.30%. The results of the N-Gain analysis showed the mathematical literacy ability of students in the rounding material and the scale increases from the first pretests of 0.7 and the second pretest of 0.77, of the two results indicate N-gain in the high category so that mathematics learning through the field trip can improve students' mathematical literacy effectively.

Keywords: *field trip, mathematical literacy, mathematics learning.*

### Abstrak

Penelitian ini bertujuan untuk meningkatkan kemampuan literasi matematis siswa Sekolah Dasar dengan menggunakan *field trip* pada pembelajaran matematika. Penelitian ini mencoba untuk menemukan gambaran umum tentang implementasi field trip mulai dari perencanaan, pelaksanaan, dan evaluasi. Lokasi *field trip* yang dituju disesuaikan dengan materi matematika, sehingga memberikan efek dalam literasi matematis siswa. Materi matematika yang digunakan dalam penelitian ini adalah materi pembulatan dan skala. Desain penelitian yang digunakan untuk uji coba adalah *one group pretest-posttest design*, dengan analisis data menggunakan uji n-gain. Pengumpulan data dilakukan melalui tes literasi matematis dan pengamatan

aktivitas siswa. Hasil penelitian menunjukkan adanya peningkatan kemampuan literasi matematis dari hasil postes dan pretes. Postes pertama diperoleh peningkatan sebesar 54.48%, dan postes kedua 8.30%. Hasil analisis N-Gain menunjukkan kemampuan literasi matematis siswa dalam pembelajaran matematika pada materi pembulatan dan skala meningkat dari pretes-postes pertama sebesar 0.7 dan pretes-postes kedua sebesar 0.77, dari kedua hasil tersebut menunjukkan N-gain pada kategori tinggi sehingga pembelajaran matematika melalui field trip untuk meningkatkan literasi matematis efektif dalam penerapannya.

Kata kunci: *field trip, literasi matematis, pembelajaran matematika.*

## INTRODUCTION

Elementary School (SD) is a formal educational institution that needs to be considered for its existence to determine the success of education at the next level, the function of elementary schools is to provide basic knowledge, attitudes and ability to students. Elementary education institutions provide several subjects that students consume, one of the subjects that has a big role in preparing students for reasoning is mathematics. Mathematics has special characteristics such as abstract, deductive, consistent, hierarchical, and logical. According to Soedjadi (2001), the abstractness of mathematics is because its basic objects are abstract, namely facts, concepts, operations and principles. Mathematical abstracts and other features that are not simple, cause mathematics is not easy to learn, and in the end, many students are less interested in mathematics (Arifuddin, 2016). This means that a solution is needed that can connect mathematical scholarship so that it is easily understood by students. Finding a solution is a challenge for mathematics teachers to determine the right learning model applied to students, where the learning of mathematics must be interesting, easy to understand, inspiring, and challenging to be involved, so that ultimately makes students intelligent mathematics. The process of receiving mathematical information from beginning to end conveyed by the teacher to students in achieving learning goals in mathematics learning.

Mathematics learning in the classroom that often occurs, the teacher does not associate the material presented with everyday life and students are given less opportunity by the teacher to build their own and get back mathematical ideas. From the results of initial observations made by the author, be seen the form of questions given to students in the form of standard mathematical sentences that only contain numbers without directing students to describe a real event when reading it. Students are given a monotonous form of abstract questions which does not invite to analyze an event so that students are not able to apply mathematics in problem-solving in their daily lives. According to Prahmana (2010), for learning mathematics in the classroom to be of significant importance it needs to be linked to real-life experiences of children. Mathematics will be quickly forgotten by children if the learning process is not

associated with real-life every day because students have no experience in applying mathematics (Heuvel-Panhuizen, 2000). The meaningful theory (meaning theory) put forward by Ausebel in Muhsetyo (2010), reveals the importance of providing meaningful learning in teaching mathematics. Meaningful learning will make the learning process more useful, interesting, and more challenging, so students will more easily understand and remember longer mathematical concepts and procedures. A good educator will always want to make his learning active, creative, effective, and fun for students, so that there is no longer fear of subjects, especially mathematics and italics that say mathematics is boring and difficult to understand (Sukayati & Suharjana, 2009).

One alternative solution to improve the quality of elementary school mathematics learning from the cognitive, affective and psychomotor aspects is through the ability to increase students' mathematical literacy. According to Program for International Student Assessment (PISA) in OCDE (2014), mathematical literacy is the someone's capability to formulate , apply and interpret mathematics in the content by doing intellectual activity/reasoning by using concept, procedure and the fact for describing, explaining or estimate phenomena or event. Kusumah (2010) defines mathematical literacy as the ability to compile a series of questions (problem-posing), formulate, solve, and interpret problems based on the existing context. Another understanding states that mathematical literacy is knowledge to know and use the basis of mathematics in everyday life (Ojose, 2011).

The application of mathematical literacy can be through exercises that are contextual so that the ability of students in reasoning a problem/situation will continue to be explored through habituation. Many people think that mathematics is nothing more than the science that calculates and looks for results. It is true that compute competence is part of mathematical literacy, but numbers are only a small part of mathematics, other contexts of mathematics are still very broad such as geometry, statistics, measurement, and logic (Silaban, 2017). Mathematical literacy is closely related to the ability to implement mathematics in everyday matters. Therefore, in mathematical literacy, the process of solving mathematical problems in real-life every day becomes an important component. An individual's ability to high-level cognitive aspects that require more fundamental skills to plan and perform a series of activities in answering open questions to achieve a set goal when faced with With a new situation is interpreted as problem-solving ability (Singh, 2009).

Efforts to facilitate the understanding and enhancement of mathematical literacy skills that are good for the students, it is necessary joyful and applicative learning with the real world to support mathematical literacy. The learning activities can be carried out through a field trip that is full of meaningful experiences for students in the real world. Field trips help the process

of understanding where students' abstract perception of mathematics becomes concrete (Güler & Afacan, 2013). Through field trip, students learn maths in real and directly know the usefulness of mathematics in daily life, so that the mathematical theories received in the class can be practised. According to Campbell & Dickinson (2006), a field trip is interpreted with another term i.e. travel to the wild. Travel to the wild is a real activity, so it can provide opportunities and experience the practice of learning. The purpose of learning must be thoroughly planned and notified before students to run according to plan. If the destination of the trip field is not previously disclosed to the student, it will cause many students who only consider the field trip as a walking course without any content learned.

The field trip is a technique of delivering lesson material by bringing students directly to a specific object outside the classroom or the school environment so that students can observe or experience directly aiming to study (Anisah, 2015). Learning through field trips, observing the real environment is done by students themselves, then through this field trip model students interact directly with what will be observed and see the more real use of mathematics on the objects visited. This is consistent with the view of Gravemeijer (1994), who said that mathematics should be pursued close to student life and be associated with everyday problems. Besides, that students must be allowed to get used to learning to do mathematical work activities themselves or do mathematical activities. Through this method, students will feel accustomed to being close and interested in mathematics subject matter.

Based on the explanation above, we can know the linkage between mathematical literacy and field trip complementary. Mathematical literacy is an application of the Drill & Practice Theory of Thorndike, where training is needed in its operations. Next is supported by Ausubel's theories of meaning, that learning mathematics requires something contextual to make learning more real and students gain meaningful learning experiences.

Research discussing the field trip and mathematical literacy has been done much, but there are differences in results in previous research. As the results of the previous research by Setyarsono (2012), it was concluded that the study in the field trip around Teluk Awur Beach was influential for student learning outcomes. The results showed that students were more actively conducting an investigation in Pantai Teluk Awur as a source of his studies. While the research of Fatkur (2013) shows the results of an implementation of a field trip method can improve SCIENCE study of nature conservation material in Grade 3 students elementary School. Patrick, Mathews, & Tunnicliffe (2013) in his research shows the field trip results in elementary school are more dominant discussing the field of management. While the results of the study of Damayanti, Suarsana, & Suryawan (2017) it was concluded that the application of Collaborative Learning Model can improve the mathematical literacy skills of class VIII junior high School. Of

the previous studies, no one has linked field trips with mathematical literacy through learning, so this research needs to be done to see the effects of field trip learning for improvement The mathematical literacy skills of elementary school students.

## METHODS

This research is a type of applied research that is the application of field trips to mathematics learning to improve mathematical literacy ability of elementary school students. The research method used is quantitative with a descriptive approach, which is intended to find a general description of the implementation of field trip learning as seen from planning, implementation and evaluation. The subjects in this study were students of class V SDIT Raflesia Depok in the first semester of the 2018/2019 school year, totalling 22 students, while the mathematics material used was about Fractions and Scales.

The design of this study was One Group Pretest-Posttest Design, with research instruments in the form of mathematical literacy questions used to measure student learning outcomes through the application of field trips in mathematics learning, as well as student activity questionnaires to measure the feasibility of field trips. Field trips were carried out twice in this study, so that each pretest and posttest were conducted twice, to find out the increase in mathematical literacy test results. The test takes the form of a description of 5 questions, while the student activity questionnaire consists of 10 statements. Single group design pretest and posttest designs can be described as follows:

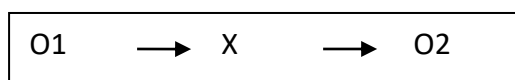


Figure 1. One Group Pretest-Posttest Design (Sugiyono, 2015)

Information:

O1 = pretest (before treatment)

O2 = posttest (after treatment)

X = treatment

Improved students' mathematical literacy skills are interpreted using normalized gain, (Hake, 2002) with the following categories:

Table 1. Normalized Gain Category

Value N-Gain	Criteria
$0,00 < N-Gain < 0,30$	Low
$0,30 \leq N-Gain \leq 0,70$	Medium
$N-Gain > 0,70$	High

## RESULTS AND DISCUSSION

### Field Trip Learning Implementation

Field trips in this study are interpreted as narrative descriptions to describe the procedures or steps of a field trip in achieving a specific goal, and these steps can be used to measure success or failure in achieving mathematical literacy abilities of elementary school students. The steps in the field trip model consist of three stages, namely the preparation stage, the implementation phase and the final / evaluation stage. An overview of the implementation of learning mathematics through field trips can be seen in the following figure:

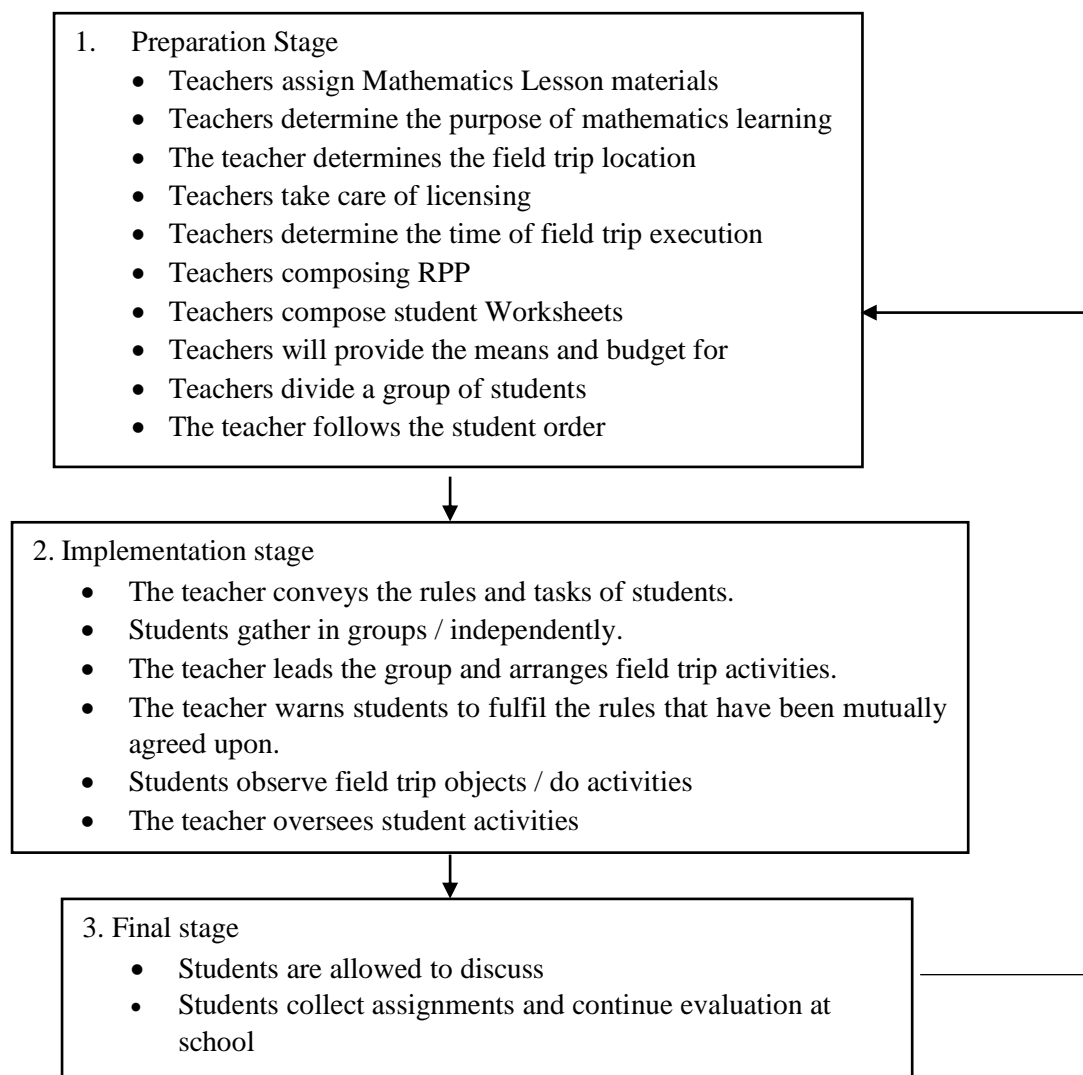


Figure. 2. Steps of Field Trip Learning Implementation

Based on the figure 2, in general, all activities in the preparation stage are carried out by the teacher, then informed by students. While at the implementation stage, students carry out activities in the field trip location, all activities have been written in a worksheet. Activities are related to mathematical questions carried out in groups. Activities describe the usefulness of mathematics in the location of the field trip, so students know first and mathematical activities in

real life. In the final / evaluation stage, students are allowed to complete worksheets with their groups (figure 3). Furthermore, further evaluation is done in the classroom, in the form of a presentation in front of the class, after which the teacher provides mathematical literacy learning (figure 4). In this study, all mathematics learning activities from the preparation, implementation and evaluation stages went well, seen from the students' enthusiasm in observing field trip activities.



Figure. 3. Minimarket Field Trip for understanding rounding material



Figure. 4. Evaluate Worksheets in Class

Field trips are learning that can be carried out in natural settings in the context of the inquiry, through observation of real-world phenomena students learn directly, formulate observational problems, conduct investigations, process and analyse data, and make an explanation of a phenomenon. Field trips not only allow students to be actively involved in learning but also help to understand the learning process and learning experiences in real-world settings. Besides, that field trips are fun activities for students, learning is more challenging than learning in class (Shamsudin, Abdullah, & Yaamat, 2013). Several studies have shown that field trips are very important activities in learning. Field trips affect students' grades, pedagogy, interests and attitudes (Davidson, Passmore, & Anderson, 2010). Other research shows that field trip activities contribute to building student knowledge (Costillo et al, 2011).

## Students Activities on The Field Trip Model

In the implementation of learning activities, researchers act as the observance of student activities in the application of field trips and also acts as a teacher. The results of the analysis of student activities on the field trip model are shown in the following table:

Table 1. Results of Student Activities in Field Trip Learning

No	Student Activity	Observation result				Criteria
		1	2	3	4	
1.	Hold discussions accordingly cooperative procedure				v	Excellent
2.	Cooperate in finding an answer to the problem given by issuing quality opinions.				v	Excellent
3.	Asking questions as an expression of curiosity			V		Good
4.	Pay attention to students' opinions another during the discussion		v			Sufficient
5.	Respond to the opinions of other students well without discriminating friends.		v			Sufficient
6.	Finish work on time			v		Good
7.	Conduct experiments based on worksheets				v	Excellent
8.	Collect and analyze experimental results data				v	Excellent
9.	Listen to the form of assignment			v		Good
10	No activity		v			deficient
Total Activity Amount		1	4	9	16	Good

Based on the results of the observation, obtained an average of 3.00 with a good category. This shows that learning objectives are achieved, making students active during learning, according to the research results Oktaviani, Subekti, & Lisdiana (2018), that students are said to be active when the overall activity is above 50%. Another result of this research is that generally students actively follow the learning steps that correspond to the field trip syntax. Also, there is an increase in group discussion activities and the activity of students in asking when the field trip is placed. So the implementation of field trips can improve students' activity in mathematics learning. Activities are indispensable in the learning activities, this is following Hidayah & Indriayu (2016), in the process of learning teachers need to give activity to the students in thinking or doing, thus the knowledge given not a Passed. Also, learning will be meaningful and effective when students actively contribute to it. This corresponds to Pribadi (2009) that the learning process will take place effectively if the students are actively involved in effective tasks and interact with the subject matter intensively.

The constructivist view of learning objectives will be achieved when students are actively establishing their knowledge in learning. Therefore, effectiveness is also influenced by students' activities in learning. This is in line with the opinion of Hiendro, Kurnianto, Rajagukguk, Simanjuntak, & Junaidi (2013), stating that the learning is said to be effective if, in the organization and discovery of information (knowledge) and the relation of information provided,



students are actively involved. Students not only passively receive knowledge given by teachers. Proponents of constructivism learning theory emphasize the importance of activity, participation, communication, culture and language in the process of human learning. The social aspects of learning are elaborated in the context of learning outside the classroom. Learning outside the classroom can enhance social relations and learn through a variety of ways including participating in activities (Fägerstam, 2012).

### **The Improvement of Mathematical Literacy Ability**

The achievement of mathematics learning outcomes obtained using a mathematical literacy test that is applied through field trips to fifth-grade elementary school students has increased in each posttest given. To find out the extent of increasing mathematical literacy ability, before being given mathematics learning through field trips, students have been given math literacy problems. So that after the field trip activities are carried out in mathematics learning, the next is given a mathematical literacy test. The results of improving students' mathematical literacy ability can be seen in the following table:

Table 2. Summary of Results of Mathematical Literacy Tests

	<b>Average Pre test</b>		<b>Average Post-test</b>	
	<b>1</b>	<b>2</b>	<b>1</b>	<b>2</b>
SD Rafflesia	28.73	35.67	78.36	85.45
% Increased	-	19.46	54.48	8.30
N-Gain			0.70	0.77

Based on the above table 2, it can be seen that the average pretest scores are still very low, this is because students are not accustomed to working on mathematical literacy problems and students' desire to read in comprehending reading problems is still lacking. Although in the first and second pretest seen a percent increase of 19.46 but it has not provided a significant increase. Next students are given mathematical literacy learning and field trip implementation will be given in each posttest. So it can be seen that the average results of the posttest score increase on each test because students have started to get used to mathematical literacy problems and are strengthened with the implementation of field trips so that students like to experience themselves when reading mathematical literacy questions.

In the first posttest, the mathematical literacy questions are arranged with the distribution of material from several fractional sub-chapters, to find out the readiness of students in accepting questions from the material that the teacher had previously submitted. The results of the first posttest showed that the average value was sufficient but not maximal, although an increase in the average value of the previous pretest was 54.48%. This is because students are getting used to mathematical literacy problems. However, in this first post-test, students were not very

prepared with mathematical literacy questions that contained material distribution from several fractional sub-chapters, so students did not focus because the context was daily learning where students usually only got one sub-material.

Next to be surer that this field trip is effective, then the second field trip and the second posttest are applied with a question design for one sub-material about Scale. Obtained the average value increases better than the first posttest. This is because the material given is more focused on one material and students are getting used to mathematical literacy problems. In the second posttest, there was an increase of 8.30% on the first posttest. While the results of N-Gain in the first pretest-posttest obtained 0.70 and the second pretest-posttest obtained 0.77, and both are in the high category.

In this study the increase in students' mathematical literacy is caused by several factors in students, among others, (a) feelings of pleasure during learning, especially during field trips, so students have their motivation in working on problems, (b) feel in mathematical literacy problems telling their experiences itself, (c) previous mathematical understanding that has been obtained from the teacher, and (d) the age of the student. While factors from outside students themselves include, the motivation of the teacher, the teacher's teaching ability and the location of the field trip visited. This is in line with the results of the study (Hiendro et al., 2013), which revealed that the ability of teachers to carry out learning made a positive contribution to student mathematics learning outcomes. From the results of the research that has been described as a show that field trips provide a positive stimulus to the increase in mathematical literacy of elementary school students.

## **CONCLUSION**

Mathematical learning through field trips in this study is generally carried out in three stages namely, planning, implementation and evaluation. From this stage, it was carried out well, as evidenced by observations of student activities in the good category, meaning that students actively participated in field trip activities to improve mathematical literacy ability. Field trips have a positive impact on mathematics learning, this is indicated by an increase in mathematical literacy ability in two post-tests, as well as the normalized N-Gain results with a high category. Based on the finding in study the teacher should be given understanding about effectiveness of field trip for learning in school, so the teacher more creative and innovative. Understanding about field trip also need to be given to student it means that field trip is a series of learning processes, that are not just a walk but are linked to the learning process. The limits in this study are the manager not ready to provide student's explanations or questions, because they are not accustomed to receiving students' visits to study.

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