Field trip model to support understanding of mathematical literacy of elementary school students

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Abstract. This study aims to provide alternative solutions to the problem of students understanding the mathematical literacy in primary schools through field trips. The field trip model is expected to generate a positive impact on students in improving mathematical literacy. Based on the results of field observations in 5th grade at 10 elementary schools in Jakarta and Depok and also the results of interviews with teachers and students regarding the implementation of the field trip model in school found that field trip that is expected to support the understanding of literacy mathematical student has not can be carried out properly. Students are enthusiastic about participating in the field trip, but the field has not been reflected in the classroom learning materials. Therefore the future requires the development of models of field trips that are more effective, efficient and practical to support the understanding of elementary school students' mathematical literacy.

1. Introduction

Mathematics is a very important lesson for everyone especially for students because mathematics has an important role in the progress of human civilization. Math can be used to solve everyday problems such as trade, land surveying, astronomy, construction and can be used to develop another discipline. The importance of mathematics to be made compulsory for school students in primary and secondary education. Someone will get used to thinking in a systematic, scientific, logic, critical, and can increase the creativity when studying mathematics [1].

At the international level, there are currently two main assessments that assess students' math and science abilities, namely TIMSS (Trends in International Mathematics and Science Study), which is the 4th annual competition to determine the fourth-grade student achievement in math and science. In the year 2015 Indonesia following the TIMSS survey for the first time, the math score gained 397 points
puts Indonesia at 45 of the 50 participating countries [2]. The next evaluation is the PISA (Program for International Student Assessment) conducted regularly every three years to determine the age of 15 years literacy students in mathematics, science, and reading. In the PISA mathematical competence, Indonesia achievement points increased from 375 points in 2012 to 386 points in 2015 [3]. However, Indonesia's rating is still below the average of OECD countries (Organization for Economic Cooperation and Development). In line with the results of research that show that students do not achieve the three components of information literacy which includes recognizing, finding and evaluating the quality of information associated with mathematical literacy, this shows that information literacy for mathematical literacy is still low [4].

Results of the assessment of mathematical ability of Indonesian students in the study of TIMSS as essentially recommends that: a) improve the learning process in schools by increasing the portion of reason, solve problems, argue and communicate, b) improving the standards and practices of assessing student learning outcomes on a daily and nationally in the classroom by measuring the raw technical skills, reasoning ability, problem solving and communicating in a balanced, c) learn the culture and internalize the cultural context in learning so that students increasingly comprehensive insight.

Many factors cause low yields of students TIMSS Indonesia, one of the causes include the textbooks used in the schools. If we look at the textbook for students used in schools, including books that have been prepared to support the curriculum in 2013, such as the Book of Mathematics Class V Curriculum 2013, are not easy to find practice questions that characteristics such questions in TIMSS. In fact, that books more involved in teaching students daily. So that students are not familiar with the problems in form TIMSS.

To support the understanding of mathematical literacy of primary school required efforts to support literacy activities. Among them is how teachers can deploy an appropriate method for learning, through which the method can increase the primary school students' mathematical literacy. This is consistent with studies, policy makers (government), schools, teachers, and parents have the duty and responsibility of each following existing capabilities [5]. By facilitating the practice of good literacy and environmental literacy is adequate, and then there is a possibility literate generation to be born in Indonesia beloved. One method of teaching that allegedly can be used to improve process quality and learning outcomes that have modern teaching principles that utilize real environment in teaching is a method Field Trip. Field trip methods are expected to generate a positive impact on students in improving mathematical literacy.

2. Method
This research uses a qualitative descriptive method that is used to get all information about the object under study directly. Sources of data were obtained through observation and interviews, while data analysis techniques used were interactive analysis models consisting of data reduction, data collection, and concluding. The research was conducted in 5th grade at 10 elementary schools in Jakarta and Depok

3. Result and Discussion
3.1 Mathematical Literacy
Mathematical Literacy supply the students with the awareness and understanding of the role mathematics plays in the modern world. Mathematical literacy is a subject that is driven by the application of mathematics that deals with real life. This allows learners to develop the skills and confidence to think numerically and spatially to interpret and analyze everyday situations critically and to solve a problem.

Literacy mathematical is the ability to identify and understand the role played by mathematics in the real world, to make a judgment established and to use and engage with mathematics in ways that meet the needs of an individual's life as something constructive, caring, and real in public life [6].

Mathematical literacy relates to the problem of "real", it means that such problems usually arise in a situation. Students must be able to resolve the real problem (real-world problem) that requires them to
use the skills and competencies they have acquired through experience in school and everyday life. The fundamental process of this is the "mathematical"; this process takes students changed from the context of real-world problems to the world of mathematics needed to solve existing problems. Mathematical brings students in interpreting and evaluating problems and reflect the solution to ensure that the solution has been found following the real situation that is causing the problem.

In this case, the mathematical literacy stepped away from the mathematics curriculum. Nevertheless, the assessment of mathematical literacy cannot be separated from the existing curriculum and instruction for students' knowledge, and ability is very dependent on what and how they learn at school and how these lessons on the evaluation. The results of the study show that students are not ready to improve the importance of mathematics in life [7].

To improve students' mathematical literacy skills is done through habituation exercises in the provision about the form of literacy, of course, it all starts from the guidance of teachers continuously until students are accustomed to doing math literacy. According to Thorndike, teaching is seen as the planning of the sequence of carefully structured lessons, communicating the material to the students and bring them to practice using new concepts or procedures. The concept and the new procedure will be more stable if the more practice (practice) is done.

3.2 Field Trip

Field trips have become a popular method in recent years to provide an opportunity for students in learning outside the classroom. The field trip is a process in which the attitudes and behaviors applied to the abstract perception of students with the methods prescribed by the environment so that it becomes concrete [8].

Field trips are also referred to as a trip instructional, school visits, or school trips, defined by Krepel and Duvall is a school trip or class for the purpose of learning, in which students interact with design, display, and performances to get the connection experience with ideas, the concept, and the subject matter [9]. Tal and Morag describe a field trip as an experience of students outside the classroom in an interactive site designed for learning purposes [10].

A field visit to bring students to a unique location and cannot be duplicated in the classroom. Each student observes the environment and creates a personally relevant meaning to what is seen. Observations in an interactive environment to help students play with the concept, this activity is often not possible in the classroom. Learning content before suddenly become relevant when students assimilate and accommodate new understanding and cognition [11]. The relationship between class field trips and experiential learning linking the field with experience and prior learning in the classroom [12].

Another definition of the field trip is any trips taken under the auspices of the school in the learning objectives. Overall, students out of class and taken to another location at a specified time. These field visits allow students to witness something real-life locations and view the topic/subject of their learning in everyday contexts and this visit allows students to gain knowledge and may be different perspectives on their topic.

Field trip is one of inquiry-based learning methods, field trips can be carried out in the context of an investigation implemented in natural settings. Students learn through observation of natural phenomena directly, form problems based on observation, conduct investigation, process and analyze data, and make explanations to a natural phenomena. Field trips not only allow students to be actively involved, but also helps understand the learning process and inner learning experience natural settings. Besides that field trips are fun activities, learning is more challenging than learning in class [13].

Theory of meaning (meaning theory) of Ausubel (Brownell and Chazal) noted the importance of meaningful learning in teaching mathematics. The meaningfulness of learning will make learning more interesting, more useful, and more challenging, so the math concepts and procedures will be more easily understood and more durable remembered by learners.

3.3 Field Trip Model to Support Understanding of Mathematical
In the Standard Mathematical School have been issued, to improve the teaching of mathematics in schools many suggestions and ideas that have been carried out by the Board of Mathematics of the National Students must learn mathematics with understanding, actively construct new knowledge from experience and previous knowledge [14]. These suggestions are based on the assumption that mathematics includes content material from a wide variety of subjects that are important for students to be implemented in the community. They recommend the use of appropriate teaching methods to help students develop cognitive skills and understanding of the concept. The ultimate goal is to develop mathematical literacy that includes reading, speaking and writing mathematics. This is the basis for the development of methods for field trips to support students' mathematical literacy.

Field trips were carried out outside the school both near and far with visits to various places indicated can integrate with mathematics. Field trips that do have several objectives:

a. Acquire knowledge through experience and curiosity of students.
b. Change the learning environment into a dynamic environment that is open and pulled out of class.
c. Develop students' ability to address relevant issues.
d. Shows the relationship between mathematics and areas such as history, geography, physics and more.
e. Reducing the anxiety of learning Mathematics.

The methods field trip is expected to generate a positive impact on students in improving mathematical literacy. This is in line with research the results showed a field trip could help students to learn. Similar results were also obtained from research at the field visits can be more effective when students had prepared beforehand, and the students are given time to reflect on what they have learned when they return to school [15].

In the process of learning mathematics, in Muhsetyo stated the importance of pressure on the student's ability to think intuitively and analytically would educate students to make predictions and skilled in finding the pattern and the relationship/linkages (relations). Updates in this learning process, from the process of drill and practice to a meaningful process, and continue the process of intuitive and analytic thinking, an exceptional effort always to improve the quality of learning in mathematics. Positive reactions to the changes have an impact that school mathematics curriculum development dynamic.

Learning exercises and operations (drill and practice instruction) and meaningful learning (meaningful instruction) are not contradictory but complementary. Given to initiate meaningful learning and learning activities, and learning drill and practice given later. Meaningful learning will make the subject matter to be interesting, rewarding and challenging, and learning drill and practice will make students familiar to the application of the concept that the concepts that will be understood and properly embedded in the minds of students.

From the two theories of learning exercises and operations (drill and practice instruction) of Thorndike and meaningful learning (meaningful instruction) of Ausubel, the literacy skills of mathematical and methods of field trips have relevance in learning mathematics primary school, because habituation exercises mathematical literacy is the application of theory Thorndike and field trips as a form of meaningful contextual learning is the application of theory Ausbel. As research conducted by this study requires children to learn mathematics through experience and curiosity and develop the ability to cope with problems that are relevant and are associated with other learning areas [16]. The results of other studies state that the effectiveness of field trips becomes clearer because it is able to connect with subject matter [17].

From interviews with some students obtained the positive response given to the activities undertaken field trip, it is seen from the summary as shown in Table 1.
Table 1. Student’s interview summary

| Name          | School                                | Response to field trips |
|---------------|---------------------------------------|-------------------------|
| Danar         | SDIT Raflesia Depok                   | v v v v v               |
| M. Fikri      | MI Darul Muqinin Jakarta              | v v v v v               |
| fatan Aziz    | SD Karakter Depok                     | v v v v v               |
| Latifa Hadi   | SDIT Al-Hikmah Depok                  | v v v v v               |
| Gendis        | MIT Nurul Falah Depok, SD Azhari Cilandak | v v v v v           |
| Shanda        | Jakarta                               | v v v v v               |
| Ghaida        | SDIT Al Barkah Depok                  | v v v v v               |
| Aufar         | SDIT Amal Mulia Depok                 | v v v v v               |
| Ridho         | SD Tugu Ibu Depok                     | v v v v v               |
| Aina          | SDIT Pondok Duta Depok                | v v v v v               |

Figure 1. interview with students from several elementary schools

Positive responses were given the students above may be the basis that the possible field trip will be able to support students' mathematical literacy. They are expected to learn math in a fun and meaningful in field trips as the integration of classroom learning. It should be seen teachers as an effective method to apply the lessons learned in the real world.

While I have found problems in the field, among others:
1) There is a discrepancy between the definition of a field trip to study the implementation of the field. Field trips were conducted almost entirely limited to making students happy (have fun) without applying the concept of the material has been received in the classroom. This is evident from the summary of interviews with some teachers almost replied with a matching answer.

“This field trip is an annual program that is our school, which is held once a semester. And aim to implement the existing program that essentially makes the students learn in the classroom is not saturated continues, the aim in particular subjects does not exist, only our most hook-associate only with the theme, the point is that the students are happy. So one semester was no different than usual activities like this miss and is highly anticipated by students.”
The above is not in line with the statement of Andrea M. Noel, learning to be optimal only when teachers are actively integrating the contents of a field trip to the curriculum. In the study of historical places frequented school, Mr. Noel and Mrs. Ann Colopy, observes that make field trips into meaningful and effective as a learning process that requires planning and collaboration that mature from teachers and conformity with the place to be visited [18]. Definitions are expecting a field trip this activity can apply the concepts of the lessons in the school not be achieved, the student merely fun and get something new that they have not seen at school or home.

2) There is no charge to the student after the field trip activities that could be accounted for in the classroom. This is in line with the statement of the respondent teachers above that says there are no specific goals for the subjects in the field trip, and therefore obtained the students' answers from the interview follow:

“No assignment anything of the teacher, here just told to look around and play alone, usually later in school only asked not happy with the field trip yesterday?”

3) From the 10 of schools only two of schools that ask for the bill field trip learning outcomes of students in the form of interviews and resume the results of the visit. The results of the interview as follows:

“There is an independent assignment of teachers to record anything we see here and later collected in the school, but not be presented in the classroom just collected it”.

“His task in the form of groups such as the results of the interview by using the camera or Hp and later copied on paper and collected in the school”.

From both interviews above, it has been good the bill the assignment to students as a result of visits made. So students have a clear goal in the field trip undertaken, but after the assignments were collect, there is no feedback from teachers of a given task.

4) In the field trip activities, teachers are also not yet a good facilitator, because many field trip activities that use the services of a guide, so that the teacher was just as an impressed audience without directly involved in there. This is evident from the results of interviews with teachers when traveling to the location of the field trip as follows:

“For the exact activities of students going to do there I do not know because we submit all to the manager of the location of the field trip, all already in the form of tour packages. Our teacher just accompanies and supervise only. We only know the cores just like there are fun games, planting, and painting. Technically what we shall see together there”.

From the interview above, the teacher has no effort in the learning process of students in the location field trip, because all have been submitted to the organizer. It would be nice if when the services of a guide are required on a field trip, teachers still need to know the technical details and implementation activities. It is important related to the preparation of teachers in adjusting the material is expected to be achieved by students. Technical events and can be known when a field survey before the field trip. The part of teachers and managers should be able to work together in the process of learning through field trip, so the guide also knows what is expected to be achieved by students from such activities.

From the results of field surveys conducted by the author with a look at various issues in the field implementation of the field trip, the author tries to enhance the definition of the field trip so that with this definition later expected to be used as a reference in the implementation of a field trip to be more focused. The field trip is a visit whatever the students outside the classroom through instruction and guidance of the teacher to complete the learning experience with a theme that has been determined, as the integration of classroom learning and evaluated. Key steps in the field trip can be done by Amprasto as follows [19]: (a) Pre field trip (b) During field trip (short and long), and (c) Post field trip.

See the problems above if it were important for the future according to the author's developed methods existing field trip designed to be attractive and the elaboration of the theory of the field trip itself. It is certainly not easy to need careful thought and observation that continues to find the right design field trip for all the schools. So expectations through field trips method can support students' mathematical understanding to run well when the implementation of the field trip is appropriate.
4. Conclusion

The meaning theory of Ausubel very appropriate in math through field trips, where the field trip as an alternative solution to support the efforts of primary school students' mathematical literacy. The meaningfulness of learning will make learning more interesting, more useful, and more challenging, so the math concepts and procedures will be more easily understood and more durable remembered by the students. From the observation to 10 elementary schools in Jakarta and Depok, there are problems in the application field trip. So that, in the future it needs efforts to develop a model of field trips which more effective, efficient and practical in its application mainly to support the understanding of elementary school students' mathematical literacy. In this case, can be referred to the steps of developing a field trip by Sanders. Through the field trip the students enjoy learning, it is very kind to use incorporate the theme of mathematical literacy in the learning activities.

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