

# Developing a Learning Decimal Counting Operation in the 4<sup>th</sup> Grade of Elementary School Students in the Context of a Floating Market

Karim, Agni Danaryanti, Sutarto Hadi

Mathematics Education

Faculty of Teacher Training and Education

Universitas Lambung Mangkurat

Banjarmasin, Indonesia

karim\_fkip@ulm.ac.id; agnimath@ulm.ac.id; sutarto.hadi@ulm.ac.id

**Abstract**—This study aims to develop a learning design of the decimal numbers counting learning on the fourth-grade of elementary school students in the context of the floating market. The mathematical learning in the context of the floating market is an effort to present the real-life context to the students or the students' mind. Thus, the given mathematical problems would be easier to understand by students. The method used in this research is the Research and Development Method with the 4D model by Thiagarajan including the steps of Define, Design, Develop, and Disseminate. On this learning development, the approach used was the scientific approach. The result of the study shows that there are five steps in learning design namely (1) let's observe, (2) let's try, (3) let's discuss, (4) let's study, (5) let's practice. The result implies that the learning will be more effective and meaningful if it uses the surrounding contexts of the students to present a real situation in the learning process.

**Keywords**— *mathematical learning; the context of floating market*

## I. INTRODUCTION

According to Gagne, mathematics consists of direct and indirect objects. Mathematics as a direct object is described into facts, concepts, principles, and skills. Meanwhile, as an indirect object, mathematics is the characteristics which can be grown on students after they learn it [1]. For students to be able to master the direct and indirect objects of mathematics, teachers' roles in designing mathematics learning is needed. Regarding mathematics learning in the elementary school, it should receive serious attention from teachers. It needs to be emphasized because there are different characteristics between the essence of students who are learning in elementary school and mathematics itself as a science. In general, elementary school students are not able to think formally, while mathematics itself is a deductive, axiomatic, abstract, and formal science. Thus, a teacher should become a bridge who reduce the gap.

In order to develop mathematics learning in the school, there are six basic principles needed to pay attention at to achieve a high-quality mathematics education; those are equality, curriculum, teaching, learning, assessing, and

technology. To develop mathematics learning, the learning principle according to NCTM is the students have to learn mathematics with understanding and actively develop new knowledge from experiences and previous knowledge [2]. Then, in order to develop the learning design, besides paying attention to basic principles, the use of a context is also needed, so students will be easier to understand the given mathematics problems. According to Polya, understanding the problems is an important step for students to solve the problems which they face [3]. De Lange stated that there are four kinds of contexts which can be used, those are students personal, school, social, and scientific context [4]. Besides the principles of learning and the use of context, the employed learning approach must also be the focus of attention. One of the learning approaches recommended in the 2013 curriculum is scientific approach. Scientific approach is a learning approach that uses scientific steps and principles in learning. Teachers must consider four important components in using the scientific approach, namely fostering a sense of wonder, encouraging observation, pushing for analysis, and requiring communication [5]. In the implementation on the learning process, these four components are described into observing, asking, information collecting, associating/reasoning, and communicating.

On the learning of decimal counting operation, most teachers are facing difficulties in teaching students to make them understand the concept well and actively involve in the learning process. This implies on the low understanding of the 4th-grade elementary students towards decimal counting learning operation. To help students understand the concept and be able to do the operation, it needs a learning innovation. The previous research studies on the learning innovation of the issue had been done by [6] and [7]. Both studies respectively developed the learning design on decimal counting operation using PMRI approach and design of decimal numbers through the decimal wheel.

This study which aims to develop the learning of addition and subtraction of decimal numbers counting operation using the social context of the floating market in Banjarmasin City is needed to conduct so the conceptual understanding and the students are actively involved in developing new knowledge

from the existing knowledge. The development of decimal numbers counting operation of addition and subtraction using social context is a new study. The goal of this study is to achieve the learning design of addition and subtraction of decimal number counting operation using the social context of the floating market. The impact of this study is the increase in students' conceptual understanding and skills on decimal numbers counting operation of addition and subtraction and the growth of students' active learning.

## II. METHOD

This study employed a 4D model of research and development by Thiagarajan consisting of Define, Design, Develop, and Disseminate steps [8]. The learning approach used in this study is the scientific approach. The effectivity test was implemented to the 4th-grade students of Islamic elementary school Sabial Muhtadin Banjarmasin consisting of 32 students. Before the try-out was conducted, the learning design was already validated by two experts in the field.

On the define step, the basic competency study on the 2013 curriculum for 4th-grade elementary school students as well as the study of the materials which are considered difficult by teachers in teaching it was analyzed. On the design step, a draft of learning design was made consisting of the learning plan, students' learning materials, props, and evaluation material. On the developing step, the validated draft was tested in to find the effectivity. The final step is the disseminating step. On this step, the learning design and its props have already multiplied and used by the teachers in the research setting.

## III. RESULT AND DISCUSSION

The learning development of decimal counting operation consists of addition and subtraction. This learning is developed using the scientific approach which includes observing, trying, associating/reasoning, collecting information, and communicating. The learning context in this study is the floating market on Alalak Tengah Street, Northern Banjarmasin and Piere Tandean Street, East Banjarmasin. The situation of the floating market can be seen in Fig. 1.



Fig. 1. The floating market situation

The result of learning development achieves five activities, those are 1) let's observe, 2) let's try, 3) let's discuss, 4) let's study, and 5) let's practice. The description of teachers and students' activities for each activity is described as follows.

### A. Activity 1: Let's Observe

- Before the lesson was started, the teacher prepares the physical and mental condition of the students to study.
- The teacher reminds the students about integers and fractions which had been learned on the previous meeting (associating).
- Students observe four pictures of the floating market which had been prepared using a projector (observing).
- Students discuss the condition of the floating market and types of goods on the boats sell by the sellers (asking, communicating).
- The students group kinds of goods on the boats according to vegetables and fruits (associating).

### B. Activity 2: Let's Try

- The teacher prepares several scales and types of fruit, according to the types on the pictures. Many fruits which have been prepared by the teachers were according to the weight of respective fruits.
- The students were grouped into several groups. One group consists of 3-4 students.
- Each group receives one scale and one type of fruit (the quantity depends on the weight of the type of the fruit). The type of fruit for each group is different.
- Each group weighs two times. The first weighing involves the quantity of fruit which is different from the second weighing. The weight on the first and second weighing were noted until one number after the decimal (trying).
- Each group adds the weight of the fruit on the first and second weighing. The result is the concept of decimal number addition (reasoning).
- Later, each group weighs again for two times. The first weighing involves several fruits. Then, on the second weighing, the number of fruits on the scale is fewer than the first weighing. The weight on the first and second weighing were noted until one number after the comma (trying).
- Each group writes the weight of the fruit on the first scaling subtracted by the weight on the second scaling. The result is the concept of the subtraction of decimal number (reasoning).
- Each group re-writes tidily using relatively large alphabet on the carton paper (information collecting).

### C. Activity 3: Let's Discuss

- The representative of each group sticks the carton paper consisting of the result on the whiteboard or the selected places appointed by the teacher (communicating).
- Alternately, the representative of each group reports the weighing activities which has been done, it is continued by explaining their results (communicating).
- The teacher encourages for the questions and answers sessions among the groups toward the activity and result achieved by each group (discussion).
- According to the discussion results, the students are able to understand the addition and subtraction operation concept of decimal number (associating).

### D. Activity 4: Let's Study

- The students return to their seats (ungrouping).
- After the students did the weighing activity, took notes of it, and discussed it, the teacher explains the concept of addition and subtraction of decimal number (associating).
- The students are given two example questions related to the addition of decimal number and two example questions related to the subtraction of decimal number (reasoning).

### E. Activity 5: Let's Practice

- The teacher asks the students to answer the questions related to the addition and subtraction operation of a decimal number (reasoning).
- After the students finish answering the questions, the teacher with the students discuss the answers of the given questions (communicating).
- The students with the teacher's guidance conclude the lesson (communicating).

The evaluation result of the students' understanding of the addition and subtraction counting operation of the decimal number shows satisfying results. 26 of 32 students who joined the test (81,25%) understand the concept well. The observation towards the students' activities in learning also shows a satisfying result. More than 85% of the students were actively involved in observing, trying, asking, and giving opinions. The expected result from the learning process implementation is already in line with the basic principles stated by NCTM about the learning principles [2]. According to those basic principles, there are two aspects that the

teachers have to pay attention in developing the learning. The first is learning mathematics with understanding is something important and not only need calculating skill but also need thinking and mathematical reasoning capabilities. The second, on the mathematics learning in the class, the students were asked to assess their own and friends' ideas, they were pushed to create mathematical assumptions, test it, and develop their abilities to deliver logical reasoning.

The result of this study is in line with [7] who stated that on the learning of decimal numbers, the game of "decimal wheel" acted as the connector on the addition of decimal number between one number decimal number after the comma or more, and make the students realize about the difference between decimal number system and integer system. Also, it is in line with [6] who stated that using PMRI approach and the context of weighing something that is around the students can help them understand the decimal number and do the addition of it.

## IV. CONCLUSION

Base on result and discussion, it can be concluded that the achieved learning design of decimal number operation consists of 5 steps of activities, those are: 1) let's observe, 2) let's try, 3) let's discuss, 4) let's study, and 5) let's practice. The implication of this study is the learning will be more effective and meaningful if using the surrounding context of the students so it can present the real situation of the learning process.

## REFERENCES

- [1] F. H. Bell, *Teaching and Learning Mathematics*. Iowa: WBC, 1978.
- [2] NCTM, *Principles and Standards for School Mathematics*. Reston VA: Arthur, 2000.
- [3] G. Polya, *How To Solve It*. New Jersey: Princeton University Press, 1973.
- [4] J. De Lange. *Mathematics, Insight and Meaning*. Utrecht: OW & OC, 1987.
- [5] S. Mc Collum. *Character Education: Managing Conflict Resolution*. New York: Chelse House, 2009.
- [6] L. Maimuna, Darmawijoyo, E. Susanti, "Pembelajaran penjumlahan bilangan desimal konteks pengukuran berat berdasarkan pendekatan PMRI," *Jurnal Review Pembelajaran Matematika, JRPM*, vol. 3, no. 1, pp. 1-17, 2018.
- [7] E. A. Afriansyah, "Penjumlahan bilangan desimal melalui permainan roda desimal," *Prosiding Seminar Nasional Matematika dan Pendidikan Matematika FMIPA UNY*, 2013, pp. 233-240.
- [8] S. Thiagarajan, D. S. Semmel, M. I. Semmel, *Instructional Development for Training Teachers of Exceptional Children*. Minnesota: Leadership Training Institute, University of Minnesota, 1974.