The Use of Fractional Manipulative Media to Increase The Conceptual Understanding of Elementary School Students

Rostien Puput Anggoro
Mathematics Education Study Program, FKIP, Universitas Ahmad Dahlan
Jl. Ringroad Selatan, Tamanan, Banguntapan, Bantul, 55191, Indonesia
e-mail: rostien.anggoro@pmat.uad.ac.id

Abstract

Learning mathematics at the elementary school level is very important in planting basic concepts about the concepts being taught. One effective way of learning mathematics in planting these concepts is by using manipulative media. Based on the results of observations of researchers in class II C of Muhammadiyah Elementary School, Nitikan, Yogyakarta obtained: 1) mathematics learning rarely uses the media, 2) the subject of fractions is difficult material with marked results of the pretest only 53.1% who reach minimum completeness criterion. This study aims to describe learning using manipulative media to improve understanding of the subject matter of fractions. This study uses a Classroom Action Research (CAR) design. The subjects of this study are class II C of Muhammadiyah Elementary School, Nitikan, amounting to 32 students. Data collection techniques used are observation and test. Data analysis in this classroom action research is quantitative and qualitative data analysis. The results showed the ability to understand the concept of mathematics in the first cycle is 62,5 % with good criteria and the second cycle is 78.1 % with good criteria. The results of observations of the feasibility of using manipulative media in learning mathematics on the subject matter of fractions seen based on the activities of teachers and students during the learning process. Based on research that has been done, it can be concluded that the ability to understand mathematical concepts and student learning activities in class II C of SD Muhammadiyah Nitikan increases after the application of learning using manipulative media.

Keywords: conceptual understanding, fractional manipulative media

INTRODUCTION

Mathematics is one of the subjects that must be taught from elementary to university. Mathematics has an important role in all aspects of human life. Besides, mathematics also acts as a support for other subjects or fields of science. This can be shown that many of the sciences whose discovery and development depend on mathematics.

Learning mathematics at the elementary school level is very important in instilling the basic concepts of the concepts being taught. By planting the correct concepts when studying in elementary school, it will make it easier for children to learn mathematics at the next level. For example, the concepts of fractions, geometry, and arithmetic, which have been studied since Elementary School, if these concepts have been thoroughly mastered by students, then at the next levels students will find it easy to learn the development of the concepts.

The reality at schools showed that from the statements of several teachers at Muhammadiyah Elementary Schools, Umbulharjo, Yogyakarta said that among all branches of mathematics taught at elementary schools, fractions were the most difficult for

students to understand, besides geometry. Based on the results of observations of researchers in class II C of Muhammadiyah Elementary School, Nitikan, Yogyakarta obtained: 1) mathematics learning rarely uses the media, 2) the subject of fractions is difficult material with marked results of the pretest only 53.1% who reach minimum completeness criterion. Often our students fail to express fraction from one form (proportion) to decimal.

Considering the importance of mathematics for education since students in elementary school, it is necessary to find a solution, how to manage the process of learning mathematics in elementary school so that mathematics can be digested properly by elementary school students (Hudojo, 2005). Fruner and Robinson (in Rochaminah, 2008) stated that to improve student's ability to think critically in learning mathematics, the learning processes must be focused on understanding concepts with various approaches rather than procedural skills. Meanwhile, Rochaminah (2008) asserted that to achieve an understanding concept, problem identification can help to create an atmosphere of thinking for students. Generally, the success in learning mathematics is largely determined by the state of the learning process applied by the teacher.

One of the effective ways to help students in learning mathematics and comprehend the concept is by using mathematical manipulative media. According to Estiningsih (1994), manipulatives media are learning media that contain or carry the characteristics of the concepts being studied. Hence, mathematics manipulative media is a learning medium that contains or carries the concepts of mathematical material being studied.

The main function of manipulative media is to reduce the abstractness of the concept so that the child is able to capture the true meaning of the concept being studied. By seeing, feeling, and manipulating props,

children have real experiences in life about the meaning of concepts (Sukayati & Suharjana, 2009). This study is generally aimed to describe learning using manipulative media to improve understanding of the subject matter of fractions.

LITERATURE REVIEW

Props are a set of concrete objects that are designed, made or arranged intentionally which are used to help instill or develop concepts or principles in mathematics (Iswadji, 2003). According to Estiningsih (1994), manipulatives media are learning media that contain or carry the characteristics of the concepts being studied.

Based on these explanations, it can be concluded that mathematics manipulatives media are learning media in the form of concrete objects that contain or carry the characteristics of mathematical concepts or principles. Mathematical manipulatives media are used in learning to make it easier to understand the concepts of mathematics taught by the teacher.

According to Sudjana (2010), understanding is divided into three categories, namely as follows: (1) the first level or the lowest level, namely understanding comprehension, starting from translation in the true sense; (2) the second level is the interpretation of interpretation, namely connecting the previous parts with the next known, or linking some parts of the graph with events, distinguishing the main and non-main; and (3) understanding the third level or the highest level, namely understanding extrapolation. Extrapolation is expected to be able to see behind the written, can make predictions about the consequences or can broaden perceptions in terms of time, dimensions, cases, or problems.

According to Alatas (2014), understanding is the result of teaching and learning that has indicators and each individual can explain or define a piece of information in

his own words. Concept understanding is the process of doing to understand correctly about a design or an abstract idea that allows a person to classify an object or event, and conceptual understanding is obtained through a learning process (Alatas, 2014).

RESEARCH METHOD

This research is Classroom Action Research (CAR). According to Arikunto (2006), Classroom Action Research is a research action taken to improve the quality of practice learning in his class. The subjects of this study are class II C of Muhammadiyah Elementary School, Nitikan, amounting to 32 students consisting of 15 male students and 17 female students. There are variables in this study two, namely the independent variable (learning with fraction manipulative media) and the dependent variable (ability concept understanding).

The research design used is research on Kemmis and Taggart models. Arikunto (2006) classroom action research Kemmis and Taggart models consist of four components, namely planning, acting, observing and reflecting in a spiral system which is interrelated between steps one with the next steps can be seen in Figure 1.
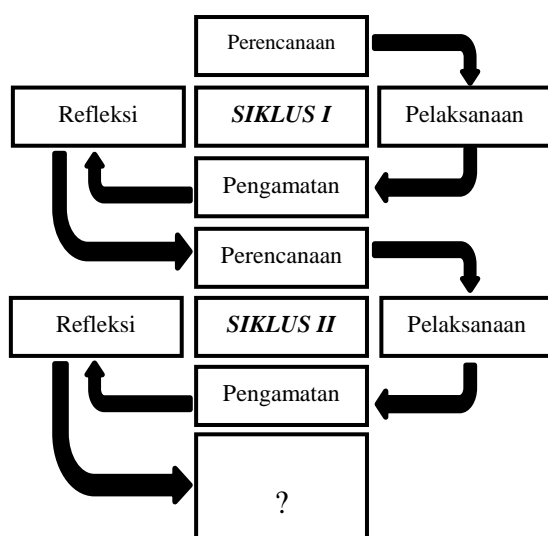

Figure 1. CAR Kemmis and Taggart Models

Data collection techniques used were observation and tests The instrument in this study used test questions and observation sheets. Data analysis in this research is quantitative and qualitative data analysis. Quantitative data is raw data obtained from the results of tests of understanding the ability of mathematical concepts, then analyzed by determining the value of the concept understanding ability tests, the average grade of the class, the average value of each indicator of concept comprehension, and classical completeness. Qualitative data is data obtained from observations of teacher and student activities in learning using fraction manipulative media that are analyzed using rating scales. Sugiyono (2013) describes that the rating scale is raw data obtained in the form of numbers and then interpreted in a qualitative sense.

RESULTS AND DISCUSSION

Carried Out Mathematic Learning

Research conducted in grade II C of Muhammadiyah Nitikan Elementary School, Umbulharjo, Yogyakarta took the subject of fractions by using manipulatives media. Learning is done during two cycles of learning outcomes starting from March 6, 2018 to April 3, 2018. Observation by researchers is carried out during the implementation of mathematics learning in class II C. This is done by paying attention to the observation guidelines for learning activities that have been prepared and to obtain an overview regarding learning mathematics using manipulative media on the subject of fractions.

The results of observations of teacher activity in learning mathematics using fraction manipulative media in cycle I were carried out 100 % with very good categories. And in cycle II the teacher's activity in learning also carried out 100 % with a very good category too.

In cycle I and II, the teacher was able to manage time well, so that the stages of learning planned according to the lesson plan can be completed as well. The teacher was able to guide and direct students during group discussions so that students begin to dare to ask questions, respond to and share ideas with their friends. Moreover, the teacher was able to bring students to do communicative presentations.

The results of observing student activities in learning mathematics using fraction manipulative media in cycle I carried out 95 % with good categories. Students can pay attention to the direction also follow the guidance given by the teacher. But when the teacher gives questions to motivate, only one student responds, and during group discussion, only a few students respond.

In cycle II students activity in learning increased to 100 % with a very good category. Students can pay attention to the direction and also follow the guidance given by the teacher. During group discussions, students begin to dare to ask questions, respond and share ideas with their group. To clarify the comparison of observations of student activities in learning can be seen in the following Figure 2.
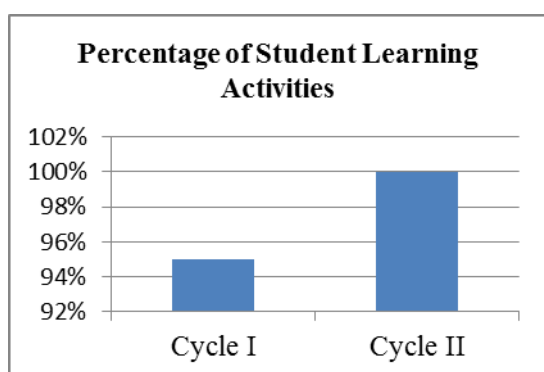

Figure 2. A Bar Diagram Percentage of Student Learning Activities

Increasing the Understanding of Concepts

Based on the pre-cycle concept comprehension test results there were 17 students (53,1 %) who completed the minimum completeness criterion that was determined while 15 students (46,9 %) did not complete the minimum completeness criterion, that is 76. While the average pre-cycle score of understanding ability student concept is 67,5 with quite good criteria.

The results of the study of students' concept understanding ability in cycle I obtained 20 students (62,5 %) who completed and 12 students (37,5 %) did not complete. While the average value of cycle I of students' concept understanding ability is 73.6 with good criteria.

These results do not meet the indicators of research success, namely students who have completed at least 24 students (75 %) of all students and the average value of students' concept understanding ability is at least 76. So, the research activity is continued into cycle II.

The results of the study of students' concept understanding ability in cycle II obtained 25 students (78,1 %) who completed and 7 students (21,9 %) did not complete. While the average value of cycle II of students' concept understanding ability is 78,3 with good criteria.

These results have met the indicators of research success so that research actions are sufficient. To clarify the comparison of the results of increasing students' understanding of mathematical concept skills can be seen in Figure 3 below.
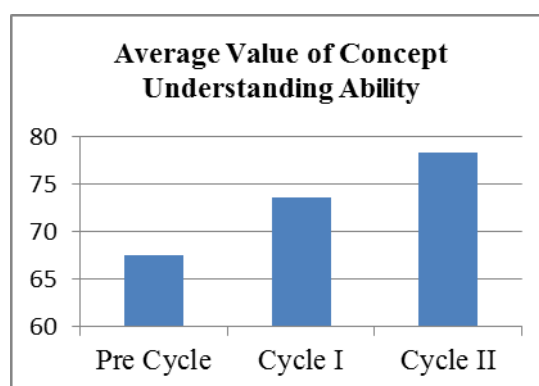

Figure 3. A Bar Diagram Average Value of Concept Understanding Ability

In general, the ability to understand the mathematical concepts of class II C of Muhammadiyah Nitikan Elementary School

has increased significantly from pre-cycle to cycle II. Learning mathematics by using manipulative media on the subject of fractions, students are able to understand the concept of fraction values and determine fractions that are valued.

This is supported by Masruroh's research (2013) that manipulative media or learning media can be used to channel messages from teachers to students so that they can stimulate students to learn more meaningfully and make students active in the learning process in class and can be mature understanding student concepts. It is also supported by Kania's research (2018) that understanding the concept of fractions of students who get mathematics learning by using manipulative objects is better than understanding concepts of fractions of students who get mathematics learning by conventional learning.

CONCLUSION

Based on the data obtained and analysis of the research data, it can be concluded that in general mathematics learning using manipulative media can improve understanding of mathematical concepts, in this case, the concept of fractions in elementary school students, especially grade II C of SD Muhammadiyah Nitikan, Yogyakarta. In particular, the following conclusions can be drawn from the results of this study: 1) Mathematics learning using manipulative media can increase the understanding of fraction concepts, this can be seen from a significant increase in the ability of understanding the concept of pre-cycle to cycle II, and 2) Mathematics learning using manipulative media can increase student learning activities.

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