The type of ethnomathematics in fish trading in Sapuran Market, Wonosobo

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ABSTRACT

This study aims to reveal the type of ethnomathematics used in the process of counting fish in Sapuran Market, Wonosobo, which can be applied in teaching processes. The method used in this study is the observation of fish trading and interviews with fish traders in Sapuran Market, Wonosobo. The research findings show that the process of counting fish in the market applies ethnomathematics, including the addition of integer and reduction of the integer. The mathematical concept used in the addition operation is the storing technique, while the reduction operation applies the borrowing technique. The implementation of mathematics teaching using the ethnomathematics approach adopted from the activities of fish counting at Sapuran Market, Wonosobo can help improve students' understanding of the addition and reduction materials for elementary school.

INTRODUCTION

Mathematics and culture are two inseparable entities. Mathematics grows and develops based on the problems in the lives of people with different cultural backgrounds. They can develop mathematics in their own way. Many people view that mathematics and culture are two different entities. This makes it difficult for them to learn mathematics. Sujoko (2011, p. 13) reveals that the method of the implementation of environmental education is a very important method and plays a very important role in quality learning process. Yusuf in Astuti and Purwoko (2017, p. 3) states that ethnomatmatics is mathematics that grows and develops in a particular culture according to a certain culture. D'Ambrosio (1985, p. 44) states:

> *"Building a bridge between culture and mathematics is an important step to understand different ways of thinking which can bring about several types of mathematics; this is the so called ethnomathematics. This may mean that a varieties of mathematical concepts can be discovered in culture, and therefore it can be concluded that mathematics and culture are interrelated. Mathematics can be born from a culture, so that a pattern is found and then utilized as one of mathematics learning resources, which is concrete and found around the students".*

The teaching of mathematics in schools is too formal and different from what the students experience in their daily lives, so that mathematics is viewed as a difficult subject. Hatimah (2009, p. 318) writes that school is a place for teaching formal culture, and therefore it is very important to discover the concepts of mathematics in culture in order to make it easier for the students to learn mathematics because they participate directly and experience the culture of their everyday lives, not

just listening to their teacher's explanation, which they get in the teaching and learning process in school.

METHOD

This research is a quantitative study. It was conducted in Surodento Village, Sub-district of Sapuran, Wonosobo Regency. The data were collected through observation and interviews with fish traders at Sapuran Market, Wonosobo. The subjects of the observation are the fish traders at Sapuran Market, Wonosobo and the subjects of the application are grade I students of elementary schools. The subjects of the observation are established by considering that they are the most knowledgeable people about the information we have expected, so that we get accurate data, regardless of their social status and level of education. The interviews were conducted by using the semi-structured interview technique in order to get comprehensive information.

The source of information is some people chosen based on some consideration. The consideration for the data source people is that they are the most knowledgeable people about the information we have expected. In this study, the data source is the organizer of the association of fish sellers at Sapuran Fish Market, whose name is Wintoro. The data analysis was done by reducing the data that had been collected and developed them to be a certain pattern so as to become a hypothesis. The data collected are generally qualitative in nature, although quantitative data were also accepted. The data analysis was conducted in order to construct the results of the observation and interviews systematically, so that we could draw a conclusion which is easy to understand by writers and readers.

FINDINGS AND DISCUSSION

The method used in counting fish in Wonosobo is the Wilangan Method. The word wilangan is derived from Javanese which means number. Based on the result of the observation and interview with the head of the association of fish sellers at Sapuran Market, whose name is Wintoro, the Wilangan Method began to be used by his father, whose name is Cipto Pawiro, more commonly called Mbah Cip by the surrounding community. Mbah Cip worked as a fish seller. This method was taught to Mbah Cip by a friend of his who came from Muntilan, Central Java. The method has been used by two generations with the same preserved pattern. In the process of selling and buying things, parents often ask their children to accompany them to the market. This is very good for the parents to introduce their children the mathematical concepts at their early age. The children are enthusiastic to see the process of selling and buying fish. Unfortunately, however, many parents are not aware that this can become a mathematics learning activity for their children.

Figure 1. Fish Selling and Buying Activity

First, the seller divides the fish counting in order to make it easy to count the fish, for example in counting 50 fish, he will divide figure 50 into multiple 5, thus resulting in 50 : 5 = 10

counts, with each counting containing 5 then the calculation needs to be done only until it comes to 10 counts. This counting stage is in line with the theory revealed by Paige (1978: 147), which says division is the opposite of multiplication. If a × b = c then c : a = b and c : b = a. Division can be defined as repeated reduction. If a : b = c, then c is obtained from a – b – b – b – b ... = 0 and b is as many as c. This is supported by the research by Izzatul Munawwaroh (2016) entitled "Ethnomathematics Pada Transaksi Jual Beli Yang Dilakukan Pedagang Sayur Dalam Masyarakat maduadi Paiton" (Ethno-mathematics in selling and Buying Transaction Done by Vegetable Sellers among the Community of Maduadi Paiton).

The second stage is starting the counting with addition operation using the technique of saving. In the Wilangan Method, saving is executed for each sum of 5. This is in line with the theory by Darhim (1997:466) which says that the addition operation in integer is often called addition only. The notation or symbol used is (+) for addition operation and (-) for reduction. Symbol (+) is commonly for addition operation or plus. While symbol (-) is reduction operation or minus. Therefore, the operation of (2 - 5) is adding a positive number of two to a negative number of five, and can be written in the form of k 2 + (-5) which means 2 – 5. The addition operation of integer is close in nature. The close characteristics of addition operation is the operation of an integer and another integer which results in another integer.

Figure 2. Couting Process Using *Wilangan* Method

In the counting process, the seller uses an aid in the form of a plastic plate for taking fish. As an example, a buyer wants to buy 20 fish and then the seller will take randomly 3, 4, 2, 5, 3, 5 and the process of counting can be illustrated as follows:

- 3 + 4 = 7, saving is done for each sum of 5, and thus in the seller's view point, 7 has a value of 1 and 2 remnants.
- 1 and 2 + 2 remnants = 1 and 4 remnants
- 1 and 4 + 5 remnants = 1 and 9 remnants, is done the saving again and added to the first saving to become 2 and 4 remnants
- 2 and 4 + 3 remnants = 2 and 7 remnants, is done the saving again and added to the second saving to become 3 and 2 remnants
- 3 and 2 + 5 remnants = 3 and 7 remnants is done the saving again and added to the third saving to become 4 and 2 remnants

Because the buyer wants 20 fish and the counting of the seller has arrived to value 4, then the counting is over and 2 fish is taken because it is the remnants in the counting. This technique of counting can be modified into an innovation in the teaching of addition operation with a varied sum of numbers, like in the following illustration.

2 4 2 2
3 + 4 + 2+ 5 + 3 + 5 = 22, since there are four markings each of which has a value of 5, therefore 4 × 5 = 20 plus the rest 2, and thus the result of the counting is 22. In its implementation in teaching, the saving is done for every sum of 10, because this process is only a bridge for the students to imagine the activity they directly experience in life.

Table 1. Comparison of Counting Results

Pairs of Numbers	Common Result	*Wilangan*
3 + 4	7	1 and 2 remnants
7 + 4	11	2 and 1 remnant
11 + 4	15	3
15 + 2	17	3 and 2 remnants
17 + 4	21	4 and 1 remnant
21 + 3	24	4 and 4 remnants

Verbalizing the counting is different from the conventional one because the saving is done when the number reaches the value of 5. With the small number of the counting and with the traders being used to addition operation, they become really good at the addition operation, not just memorizing the result of each pair of numbers. Mastering the addition operation process, the students will find it easy to solve problems related to addition operation. They will know the steps to solve the addition operation problems. Addition is the basic materials that have to be mastered in order to learn mathematics. By thorough mastery of the addition concept, the students will find it easy to understand the next materials taught to them.

CONCLUSION

Based on the result of the discussion, it can be concluded that in the tradition of counting fish at Sapuran Market there is a mathematical model in the form of the concept of addition using the technique of saving. This concept can be applied in teaching year 1 students of elementary school under the theme Myself, with the aim of improving the students' understanding of addition operation using the technique of saving. Saving can be modified when the amount is 10. The amount of saving is in tens and the rest is one-digit number. By applying ethnomathematics, the tradition of buying and selling fish at Sapuran Market, Wonosobo can improve the students' understanding of addition operation; the students not only memorize the result of each pair of numbers but also understand how to solve the addition operation of each pair. To add using the technique of saving, the students can make the first number even and become 10. The even number is taken from the second number, and then the rest of the even number 10 is in the form of one-digit number. The moral teaching is the character of accuracy, carefulness, honesty, law-obedience, care, discipline, mutual help, respecting others, responsibility, and persistence. Mathematics will remain difficult, but how can we make the difficult thing become enjoyable to learn? Therefore, by making the process interesting to learn, it is expected that the students' fear in learning mathematics will be eliminated.

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