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ETHNOMATHEMATICS IDENTIFICATION IN BATU URIP COMMUNITY ACTIVITIES TO IMPLEMENT MATHEMATICAL CONCEPTS

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Abstrak

Budaya merupakan sesuatu yang sudah melekat secara turun-temurun dalam kehidupan sehari-hari, karena budaya merupakan kesatuan yang utuh dan menyeluruh yang berlaku dalam suatu komunitas, sehingga memungkinkan adanya konsep-konsep matematika yang tertanam dalam praktek-praktek atau aktivitas matematika. Seperti yang kita ketahui bahwa matematika merupakan pembelajaran yang menakutkan bagi peserta didik, selain menakutkan juga masih banyak siswa yang merasa cemas ketika belajar matematika, hal Ini menunjukkan bahwa belajar matematika siswa belum bermakna, sehingga pemahaman siswa tentang konsep masih sangat lemah. Tujuan penelitian ini adalah untuk menidentifikasi etnomatematika yang terdapat dalam aktivitas masyarakat batu urip. Penelitian ini merupakan penelitian kualitatif deskriptif dengan menggunakan metode etnografi. Penelitian ini dilakukan di kelurahan batu urip kecamatan Lubuklinggau Timur I kota Lubuklinggau. Objek dalam penelitian ini adalah aktivitas sehari-hari yang dilakukan masyarakat batu urip dalam kegiatan jual-beli seperti ukuran berat dan pengelompokan barang. Hasil dari penelitian menunjukkan bahwa aktivitas masyarakat dalam menjual dan mengukur berat sayur, buah, beras terdapat unsur-unsur etnomatematika yang dapat digunakan dalam pembelajaran matematika yang berkaitan dengan kebudayaan dalam kehidupan sehari hari, adapaun konsep yang ditemukan adalah konsep sistem persamaan linier dan proses matematisasinya, dan konsep limit fungsi seperti 1 *canting* beras, 1 *sisir* pisang, 1 *kebat* dan 1 *cumpuk* sayur.
Kata Kunci: Etnomatematika, konsep matematika, batu urip

Abstract

Culture is something that has been inherent in everyday life for generations, because culture is a complete and comprehensive unity that applies in a community, so that it allows for mathematical concepts embedded in mathematical practices or activities. As we know that mathematics is a frightening learning for students, besides being frightening, there are still many students who feel anxious when learning mathematics, this shows that students' mathematics learning is not meaningful, so that students' understanding of the concept is still very weak. The purpose of this study was to identify ethnomathematics contained in the activities of the Batu Urip community. This research is a qualitative descriptive study using ethnographic methods. This research was conducted in the Batu Urip sub-district, Lubuklinggau Timur I district, Lubuklinggau city. The object of this study is the daily activities carried out by the Batu Urip community in buying and selling activities such as weight measurements and grouping of goods. The results of the study indicate that in the activities of the community in selling and measuring the weight of vegetables, fruits, and rice, there are ethnomathematics elements that can be used in learning mathematics related to culture in everyday life. The concepts found are the concept of a linear equation system and its mathematization process, and the concept of function limits such as 1 rice canting, 1 banana comb, 1 kebat and 1 vegetable cup..
Keywords: *Ethnomathematics, mathematical concepts, Batu urip*

INTRODUCTION

Mathematics and culture are a unity that cannot be avoided in everyday life which is something that is complete and comprehensive and applies from generation to generation in social life (Araujo et al.,

2022). Meanwhile, according to Atikah (2024) education and culture cannot be avoided in everyday life because both are complete and integrated entities that are relevant to a society. This is in line with the opinion of Rachmawati (Rachmawati, 2012) who states that culture is something that has been embedded from generation to generation in everyday life, because culture is a complete and comprehensive unity that applies in a community, making it possible for mathematical concepts to be embedded in mathematical practices or activities. As we know, mathematics is a scary lesson for students. Apart from being scary, there are still many students who feel anxious when learning mathematics.

This shows that students' learning mathematics is not yet meaningful, so students' understanding of concepts is still very weak. even though mathematics is a human activity, so in learning mathematical objects it must start with real problems in everyday life or close to one's mind (Herawaty et al., 2018). Mathematics has become part of human culture. However, most people often do not realize that they have applied mathematics in their daily lives. They view that mathematics is only a subject studied at school (Rahmawati & Muchlian, 2019).

Teachers need to understand the schemes that students already have and provide opportunities to rediscover and construct their own mathematical ideas. Therefore, mathematics learning really needs an ethnomathematics approach to teach abstract mathematical concepts to students. This is as stated by (Sarwoedi et al., 2018) that ethnomathematics is influential in introducing, explaining concepts, transforming mathematical symbols and solving problems. In order to realize this learning, it is necessary to identify and explore local cultures that have the potential to be related to concepts in mathematics, and such mathematics learning is called ethnomathematics. This is as stated by Yanti & Lubis (2018) that in addition to conventional methods, mathematical concepts can be conveyed using tools or media that are culturally easy for students to understand. Cultural characteristics in mathematics learning can be associated with ethnomathematics. Ethnomathematics was first introduced by a famous mathematician from Brazil named D'Ambrosio in 1985. Ethnomathematics is a way to bridge mathematics and culture (Setiana et al., 2021), while D'Ambrosio (1985) stated that "the purpose of ethnomatics is to recognize that there are different ways of doing mathematics by considering academic mathematical knowledge developed by various sectors of society as well as considering the different ways in which different cultures negotiate their mathematical practices in grouping, counting, measuring, designing buildings or tools, playing and so on".

Amirah & Budiarto (2022) say that ethnomathematics objects contain mathematical concepts in the culture of a particular society, in the form of traditional games, crafts, artifacts, and activities that have cultural forms, and this is in line with the aims of ethnomathematics proposed by Sulaiman & Nasir (2020), namely to study how students can understand, manage and apply cultural concepts in solving mathematical problems and practicing them in the environment. Thus, ethnomathematics is a science that is used to understand mathematical concepts using cultural tools or media or relating them to culture. As said by Yanti & Lubis (2018) ethnomathematics is a science that is used to understand how mathematics is adapted from a culture, through ethnomathematics, it can provide more enjoyable mathematics learning, can bring students closer and introduce them to their culture, can make learning more meaningful, and can increase students' interest and motivation in learning mathematics.

Indonesia is a country with various cultures, ethnicities, religions and languages. Indonesian culture is very varied, starting from traditional houses, clothing, regional songs, traditional ceremonies, even habits that have been passed down from generation to generation, such as buying and selling activities. One of the areas with cultural diversity is Batu Urip which is one of the sub-districts in the city of Lubuklinggau, South Sumatra. This sub-district is a historic

area, where the original traditional houses of Lubuklinggau city still stand strong, almost 80% of the people are native Lubuklinggau residents who still use regional accents and languages, and the culture is still strong. Various studies have been carried out to explore ethnomathematics in society, such as the research of Yanti & Lubis (2018) which identified ethnomathematics in the Bengkulu people's saying "fish sejerek, rice secupak" and found mathematical concepts such as linear equations and also function limits, then the research of Rahmawati Z & Muchlian (2019) who explored the ethnomathematics of Rumah Gadang Minangkabau, West Sumatra and found the concept of geometric transformation.

METHOD

This type of research is qualitative research with an ethnographic approach. Qualitative research (Sugiyono, 2013) is research based on post-positivism philosophy, used to research the conditions of natural objects, where the researcher is the key instrument, data sources are taken purposively and snowball, data collection techniques are triangulation (combination), data analysis is inductive/qualitative, and the results of qualitative research emphasize meaning rather than generalization. Meanwhile, the ethnographic approach is an empirical and theoretical approach which aims to obtain an in-depth description and analysis of the culture in Batu Urip and its mathematical concepts based on intensive fieldwork. In this research, an ethnographic approach is used to describe, explain and analyze mathematical concepts contained in the culture of the Batu Urip community.

RESULTS AND DISCUSSION

Based on fieldwork analysis through observations and interviews, an overview and meaning of Batu Urip culture in trading activities is obtained which contains mathematical concepts and can be used as learning related to everyday life. The mathematical concepts found from this expression are the concept of linear equations and the concept of function limits.

Based on the results of interviews with the community in Batu Urip, it was found that when selling their garden products such as vegetables, fruit, fish, chilies, rice and so on, they do not use scales but rather canting to sell rice, beans, mussels and so on, then cumpuk to sell chilies, onions, tomatoes and so on, then kebat is usually used to sell vegetables, fruit and also fish, and combs to sell bananas, and carpets to sell eggs. From this activity, mathematical concepts are studied which are described as follows.

Concept of a system of linear equations

The activities of the Batu Urip community in selling their garden products can be used in learning that is linked to daily life and relates to local Batu Urip culture so that learning is more interesting and of course this can foster the character of love for the country, in line with Edi's (2021) research which states that ethnomathematics-based learning will increase the feeling of love for the country towards national cultural riches. Moreover, the current independent curriculum certainly emphasizes activities related to the character of students. as stated by Hadijah et al., (2019) that learning mathematics by linking it to cultural elements found in the surrounding environment can help students understand material concepts, so that learning is more contextually meaningful and can increase student motivation and learning outcomes. Studying the concept of linear equations with two variables, students must understand and even memorize the concepts of elimination, substitution, combination and graphs which make students feel difficult. In fact, students should be able to discover these concepts themselves, as Widada (2015) said, that to achieve a principle and concept, one must start with something that is close to the student's mind first, which starts from a horizontal mathematization process and then continues with a vertical mathematization process so that a principle and concept can be achieved.

To achieve the concepts and principles of the Equation System, contextual problems related to community activities in Batu Urip that contain ethnomathematics can be given as follows:

1) First case (linear equation with one variable)

a buyer who buys 4 cantings of rice, if the 4 cantings equal 1 kg then can we determine the size of 1 canting?

From these problems, students can carry out mathematics as follows.

Figure 1. first case mathematization process

Indirectly, students will definitely be able to determine how much 1 canting of rice weighs, without doing or writing down the mathematical model first, such as 4x = 1, or if the question is changed to 4 cantings of rice, the price is IDR. 12,000,- then students can also directly answer that the price of 1 canting of rice is Rp. 3,000,-. This process is called the mathematization process which makes students understand mathematical concepts because they are associated with mathematics in culture. Students are able to deduce their own concepts from linear equations. This is proven by the results of research conducted by Yanti & Lubis (2018) which used the concept of Bengkulu culture in mathematics learning.

2) Second case (2 variable linear equation)

For linear equations between two variables, of course what must be understood is how students eliminate or substitute variables. With the mathematization process using real problems with people's habits or culture, of course this method will be much easier for students to understand, so learning will be more meaningful because it provides something real first and then abstracted in mathematical form.

To achieve the concepts and principles of Systems of Linear Equations in Two Variables, contextual problems such as the following can be given.

“Batu Urip is an area where people's homes still uphold customs and culture, their houses are still shaped like stilts. Apart from farming and gardening, the activities of the Batu Urip community include selling agricultural and plantation products in front of their houses, because in Batu Urip itself there is a road that is often crossed by the community. One of the things sold by residents in Batu Urip is garden produce such as eggplant, and ferns. Residents sell these two types of vegetables in piles and kebat. Mrs. Dwi and her friend, Mrs. Vera, who happened to be passing by on Jalan Batu Urip, were interested in buying several kinds of vegetables. Apart from being fresh, the prices offered were much cheaper. Mrs. Dwi bought 3 fern vegetable kebats and an eggplant cake, while her colleague, Mrs. Vera, bought 2 fern kebats and 1 eggplant cake. It turned out that after being asked how much in total had to be paid, Mrs. Dwi and Mrs. Vera were surprised because it was very cheap, namely Rp. 10,000 and Rp. 6,000. Can you try to determine the price of 1 bunch of ferns and 1 bunch of eggplant?"

Based on the problems above, students can carry out mathematical activities as follows.

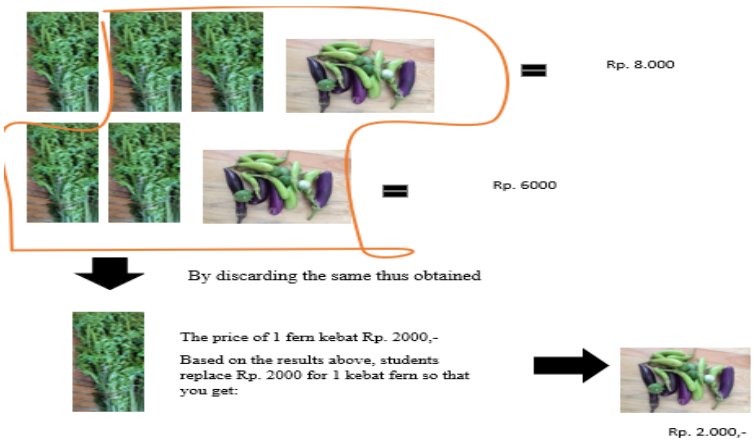


Figure 2. second case mathematical process

The next level contextual problem is as follows.

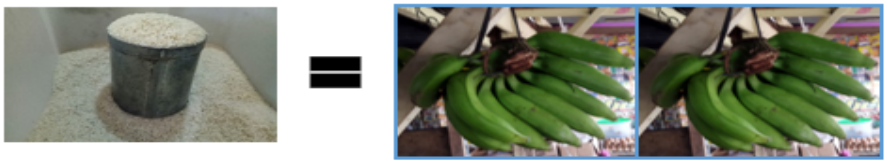
"To carry out a hemp alms event as a form of gratitude for the abundant harvest, the people of Batu Urip flocked to bring their garden produce. The tribal chief made provisions for the hemp alms event this time, people could bring harvests worth Rp. 30,000. Pak Husni brought 2 combs of bananas and 2 cantings of rice to cook with the other residents, while Mang Cik brought 4 combs of bananas and 1 canting of rice.

a) Without knowing the respective prices of bananas and rice, can you determine which is more expensive? explain your reasons!
b) How much does 1 banana comb cost?
c) How much does 1 canting of rice cost?

Based on the problems above, students can carry out mathematical activities as follows.

Figure 3. The third case mathematization process

From the above mathematical process, it is obtained that.



The price of rice is more expensive than the price of bananas, because 1 canting of rice is the same as 2 combs of bananas

Figure 4. Settlement process

Then, replace 2 banana combs with 1 rice canting, so that you get,

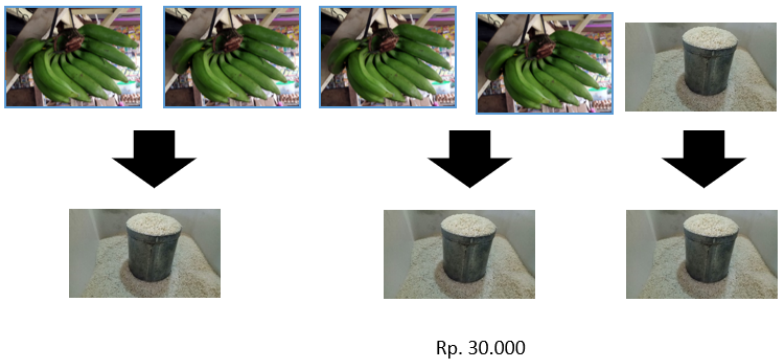


Figure 5. Settlement process

From this mathematization process, students will be able to determine how much 1 rice canting and 1 banana comb costs. With a mathematization process like this, students will later be able to discover the concept of linear equations for two variables by themselves using the substitution method, and this is proven based on research conducted by Widada (2015) that more than 82% of students are able to achieve concepts and principles with a mathematization process like this, plus the problems given are contextual problems related to the culture of the Batu Urip community, of course this can also train and familiarize students with literacy activities.

In this way, the activities of the Batu Urip community can be used as learning related to culture (ethnomathematics), apart from learning, students can also indirectly preserve that culture.

The concept of function limits

Batu Urip community activities also contain the concept of function limits where everything they sell uses the term "almost, or close to". 4 cantings of rice weigh close to 1 kg, then tied fruit also weighs almost 1 kg, 1 comb banana is close to 1 kg, and 1 carpet egg weighs close to 2 kg, as well as other activities which when measured weigh the equivalent of 1 kg.

Researchers conducted an experiment on 1 banana comb, it turned out that after weighing 1 banana comb the result was close to 1 kg or even more. In 1 banana comb there are 5-20 bananas. Table 1 below shows the weighing results of 1 comb of bananas, with x being the number of bananas in 1 comb, and y being the average weight for 1 comb of bananas in kg (the bananas weighed at that time contained 20 pieces).

Table 1. Size for 1 banana comb

x	17	18	19	20
y	0,95 kg	1 kg	1,1 kg	1,2 kg

From table 1 it can be seen that every 1 banana comb containing 17-20 pieces weighs close to 1 kg. this is defined by the concept of a function limit which is defined as $\lim_{x \to c} f(x) = L$ if and only if f(x) approaches L for all x approaches c.

One canting of rice, canting is the measurement used by the Batu Urip people to weigh rice. Based on information obtained from the public, 1 kg of rice is the same as 4 small cantings. Then the researchers tried to weigh it and it turned out that 4 cantings of rice were indeed close to 1 kg. As for table 2, which is the result of an experiment weighing 1 canting of rice which is described as follows.

Table 2. Experimental results on weighing 1 canting of rice

1 canting beras	2 canting beras	3 canting beras	4 canting beras
0,28 kg	0,58 kg	0, 78 kg	1,08 kg

Note: The filled canting is usually flat and some is cone-shaped

Based on this, it was found that the activities of the Batu Urip community in canting rice or calculating the weight of rice have a mathematical concept, namely function limits which can be used as an illustration in learning related to daily life based on culture, so that learning will become more meaningful.

CONCLUSION

From the results and discussion above, it can be concluded that people's activities in selling and measuring the weight of vegetables, fruit and rice contain elements of ethnomathematics which can be used in learning mathematics related to culture in daily life, while the concepts found are the concept of a system of linear equations and its mathematization process, and the concept of function limits such as 1 canting of rice, 1 comb of bananas, 1 kebat and 1 pile of vegetables.

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