Ethnomathematics Exploration in the Tobacco Drying Process

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Abstract. Ethnomathematics is one of the efforts to learn mathematics contained in a culture. The culture in question is the habits, attitudes or activities carried out by the community to preserve culture. One of the cultural activities in which there is ethnomathematics is the culture carried out by the people of Wuluhan District, Jember Regency. One of the districts known as the largest producer of tobacco. There is ethnomathematics in the tobacco drying process carried out by the Wuluhan community. There are mathematical concepts such as counting, measuring and designing in the process. The purpose of this study was to explore the existence of ethnomathematics in the activity of drying tobacco leaves in the Wuluhan community. The method used for this research is data collection using observation and interviews. In the harvesting process, which is carried out in stages, there is the concept of counting. For the mathematical concept of measuring, there are stages of measuring the distance between tobacco leaves and determining the length of the rope. In the design activity there is a mathematical concept in the form of making a tobacco warehouse.

Keywords: ethnomathematics · tobacco · exploration

1 Introduction

Mathematics is a subject that is often considered difficult for students to learn and understand. Mathematics material taught in schools sometimes makes it difficult for students to understand it, especially with students' perspectives on complicated mathematics. This may be we can see how mathematics is taught and how it is taught. Because mathematics has an important role in everyday life, mathematics will always be related to solving problems around us, such as calculating profits from buying and selling, determining the area of a land, calculating the time taken on a trip, and others. Wahyuni (2016) [1]. In addition, studying mathematics can make us accustomed to thinking systematically, using logic, critically, and can increase our creative spirit. It can be interpreted that it is important for all of us to learn and understand mathematics. Soni (2013) [2].

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We can not only learn mathematics at school, but we can find mathematics in getting to know a culture around us. Education and culture are something that we cannot avoid in everyday life, because culture is a complete and comprehensive unit that applies in a society, and education is a basic need for every individual in society. [3] Through ethnomathematics, mathematical concepts can be studied in cultural practices. With ethnomathematics, students will better understand how their culture is related to mathematics, and educators can instill noble values of the nation's culture that have an impact on character education [4].

In everyday life, we cannot be separated from the existence of cultural elements in our environment. Culture is what can affect what we do in our lives. [3]. One of the cultural life that can be seen in the community is farming activities. Like the culture in the southernmost district of East Java Province which is famous for producing tobacco. Jember Regency is one of the largest tobacco producers in Indonesia. People in Jember who earn their livelihood by farmers at the end of the rainy season will plant tobacco in their fields. And the farmers themselves carry out the activities of planting, harvesting and drying. Wuluhan District is one of the districts in Jember Regency which has a tobacco drying culture.

Based on this description, it is necessary to conduct research related to ethnomathematical activities which aims to see the existence of mathematics in the tobacco drying process. Especially in the activities that exist in the Wuluhan community in carrying out tobacco farming activities. This is due to the large area of land used for growing tobacco in Wuluhan village and the community's own tobacco processing. So, a study is proposed with the title of research, namely "Exploration Of Ethnomathematics In The Drying Process".

2 Method

The research method is the method used by researchers in collecting research data. The research method used by the researcher in this research is qualitative with an ethnographic approach. Qualitative research that aims to be able to understand the phenomena experienced and occur by research subjects such as behavior, views, motivations, actions and others. While ethnography is an empirical and theoretical approach that aims to obtain an in-depth description and analysis of culture based on direct field research. The research method for collecting data is by observation and interviews. The interview guide that is widely used is the "semi-structured" form. In this stage, the researcher first asked some questions that had been prepared. Then deepen the explanation from the resource person by looking directly at the process. Thus the answers obtained can cover all variables, with clear and complete information. And information is collected by observations and field notes. And to prove the research, researchers also provide documentation results. Documentation is other supporting data such as photos that can be used as support or reinforcement in conducting research. And the area used for research is in the village of Tanjungrejo, Wuluhan District, Jember Regency, East Java. The research subjects are 2 people who work as farmers and work to carry out the tobacco drying process.

Fig. 1. The process of harvesting tobacco leaves

3 Results and Discussion

Based on the results of observations and interviews from the tobacco drying process in the Wuluhan community, there are ethnomathematics in the process. Among them are counting, measuring and designing activities. The research was conducted in the village of Tanjugrejo, Jember Regency on people who are tobacco farmers and tobacco dryer workers (sujen). This tobacco drying process has a cultural process that is owned by the Javanese people. And in the process there is also a mathematical calculation. There is a term commonly used by the Tanjungrejo community in the drying process activities related to mathematics.

Based on the results of the study, several ethnomathematics were obtained in the activities used by the Pendalungan community, namely counting activities, measuring activities, and designing activities. This research focuses on the harvesting process, the tobacco leaf process in Sujen, the tobacco leaf drying process, and the calculation of tobacco drying time, and the design of the tobacco warehouse (where the tobacco drying process is carried out).

3.1 Counting Activities

The ethnomathematics that appear in the counting activity is related to the research carried out during the harvesting and drying process of tobacco. It can be seen in Fig. 1, in the harvesting process carried out on tobacco plants that are 60 days old, tobacco leaves will be picked gradually, each harvesting will be picked about 5 tobacco leaves starting from the lowest leaf. This harvesting process will be carried out about 7–8 times of harvesting. And harvesting distance is usually about 4–5 days. It can be seen in Fig. 2, that Wuluhan people usually make it easier to collect tobacco leaves before being taken to the tobacco warehouse, they put the leaves to collect tobacco leaves in rectangular sacks which people usually call “dodotan”.

After the tobacco leaves are processed through the sujen and ngeler process, the tobacco leaves hanging on the raffia rope will be dried on top of the tobacco warehouse (nyiger). In Fig. 3, it shows that the length of time for drying tobacco leaves is 1 week, it can be seen that the tobacco leaves which initially started to be green in color within a week turned slightly yellow on some sides. This indicates the occurrence of drying in tobacco leaves.

Fig. 2. the process of collecting tobacco leaves in dodotan

Fig. 3. Tobacco leaves that are dried for one week

In Fig. 4 there is a picture of tobacco leaves that have been dried by hanging for 2 weeks. It can be seen that the tobacco leaves have turned yellow and even some of the sides have turned brown.

And in Fig. 5 it can be seen that the tobacco leaves have turned brown and look dry. The tobacco leaf in Fig. 5 shows that the tobacco leaf is ready to be dropped and ready to be marketed.

3.2 Measuring Activity

In the measuring activity, in the subduction process, the farmer prepares a rope with a length of about 2.5 meters. And in each rope is filled with about 50 tobacco leaves. It is found in measuring the distance between the tobacco leaves during the drooling process.

Fig. 4. Tobacco leaves that are dried for 2 weeks

Fig. 5. Tobacco leaves dried for 3 weeks

It can be seen in Fig. 6. In this activity a mathematical concept appears in the form of measuring the distance of the tobacco leaf on the rope so that it is not too close or too far away. Usually the distance from tobacco leaves to other tobacco leaves is about 3–4 cm. Ethnomathematics from various regions that show a relationship ethnomathematics with concept [5–8].

Fig. 6. Sujen process (stabbing/stabbing tobacco leaves using iron)

Fig. 7. The ngeler process (providing the distance between the tobacco leaves)

In Fig. 7, the Wuluhan people call it the ngeler stage, which is to spread and give the distance between the tobacco leaves so that they do not stick together and are close together. The mathematical concepts seen at this stage are measuring distances and calculating the number of ropes that will be used. Ethnomathematics uses broad mathematical concepts related to various mathematical activities, including grouping, counting, measuring, designing buildings or tools, playing, determining locations, and so on. [9–14].

3.3 Design Activities

In the design activity, we can see in Figs. 8 and 9, which are pictures of a tobacco drying place or commonly called a mbako warehouse. This tobacco warehouse is shaped like a house made of bamboo arrangements, and is covered by welit. In Fig. 8, the shape of the warehouse is like a beam and the roof is a triangular prism. While in Fig. 9 it can be seen how the framework in the tobacco warehouse is made of bamboo. The tobacco warehouse is designed like the picture with the aim of being a place to hang tobacco leaves that have been prepared and sold.

Based on the Fig. 8 and Fig. 9, said that Ethnomathematics raises cultural wisdom so that it can motivate students in learning mathematics. [11, 12, 15, 16]

Fig. 8. Tobacco Warehouse

Fig. 9. Skeletons in a tobacco warehouse

4 Conclusion and Suggestions

One of the cultural lives that we can observe in the Wuluhan community is farming activities. We can realize that the Wuluhan community's activities in tobacco farming are related to mathematics, such as the activity of calculating the age of tobacco, taking tobacco leaves, the process of submitting tobacco leaves (sujen) and others. We can find these mathematical activities starting from harvesting tobacco to the post-harvesting process of tobacco. The community can calculate the time when the Temakau leaves are ready to be harvested, determine the distance during the submission process and weigh the dry leaves before being sold. The processing of tobacco harvests until the leaves become dry cannot be separated from mathematical calculations.

Some of the activities carried out by the Wuluhan community include counting, measuring, and estimating. Counting activities carried out by the community such as counting the amount of tobacco that is subducted and put in a rope. While the measurement activity can be seen from the process of measuring the length of the rope and also measuring the distance between the leaves of one another in the rope. In the weighing process, the activity of measuring the weight of tobacco also occurs. In the activity of estimating the occurrence of activities such as estimating the time when the tobacco is ready to harvest and when the tobacco leaves are dry and ready to be sold.

From this activity, we can see the existence of ethnomathematics in the drying process of tobacco leaves. We can learn how the tobacco drying process and also learn mathematics in it. A culture of the community around us can also provide us with learning mathematics. And we can learn mathematics from everything we do. From here we learn mathematics learning not only we get in the material taught at school but by getting to know the culture that is around us can also give us math lessons.

Based on the results of the study, the researcher hopes to develop interesting teaching materials and at the same time introduce the culture that exists in the Wuluhan community. By utilizing ethnomathematics, it can help teach mathematics from a cultural point of view and become a breakthrough for teaching mathematics learning materials not to be boring.

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