




Exploration of Ethnomathematics in Making of Traditional Pempek Palembang

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Abstract

In mathematics learning, there is a tendency for the context used not always to be related to the student's environment. So, this research aims to find the relationship between culture and mathematical concepts, which can be used as a learning model. The method used in this research is descriptive qualitative. The data analysis follows the Miles and Huberman approach, including data reduction, data presentation, and drawing conclusions. The data collection techniques used by researchers were observation and interviews. The process of making pempek consists of 3 parts, pempek submarine, pempek, pempek lenggang, pempek lenjer. Based on the findings made in the field, traders make pempek lenjer. Therefore, the researcher only reviewed the ethnomathematics of making Pempek Lenjer. The manufacturing process is divided into four ways: mixing process, forming process, boiling process, and frying process. Based on the process found, here is how it works and its relationship to mathematics. The results of this research found several mathematical concepts, including the concept of addition, the concept of subtraction, the concept of calculating time, the concept of comparison, and the concept of space geometry. This research creates a culture-based mathematics learning model. So it can be used as reference material for teachers.

INTRODUCTION

In mathematics learning, teachers generally use contextual problems at the beginning of learning (Fadilah & Afriansyah, 2021). However, there is a tendency for the context used not always to be related to the student's environment. This can be caused by taking the context from mathematics textbooks so that students have difficulty imagining or understanding the context being taught. The cultural and social values that exist in society can be effective in helping students understand mathematical knowledge (Supriadi, Dahlan, Sari & Madio, 2021). This statement explains the importance of cultural and social values in helping students understand mathematical knowledge. By utilizing cultural and social values in mathematics learning, teachers can create an inclusive and meaningful learning environment for all students and help them develop a deeper understanding and strong connection with the learning material. In the context of cultural sustainability, traditional food plays a vital role as an inseparable element of the daily

life of a culture, as stated by Marwanti (2019), who emphasizes the integral role of traditional food in maintaining cultural identity and values.

According to Marwanti (2019), traditional food is an integral part of the daily life of a culture. This food is not only consumed as an ordinary daily dish but also as a special dish at various celebrations and important events. Moreover, traditional foods often have strong cultural values and have been passed down from generation to generation. Thus, traditional food fulfills physical and nutritional needs and maintains cultural identity and ancestral heritage values. To increase the relevance and depth of students' understanding of mathematics, Bishop highlights the importance of integrating community cultural values in the learning process, creating a close relationship between subject matter and the realities of students' lives.

Bishop emphasized integrating community cultural values in mathematics learning (Dahlan, 2019). Bishop notes that integrating cultural values in mathematics learning is critical to helping students understand mathematics concepts better. Culture strongly influences how individuals view and understand the world, including studying mathematics. By incorporating community cultural values in mathematics learning, teachers can make the material more relevant and meaningful for students, increasing their interest and involvement in learning. Therefore, Zhang & Zhang argue that internalizing ethnomathematics is necessary in mathematics learning activities (Dahlan, 2019; Arofah & Noordiana, 2021). Zhang & Zhang's opinion regarding the importance of the ethnomathematics internalization process in mathematics learning is based on previously described concepts. Ethnomathematics is an approach to learning mathematics that emphasizes the importance of understanding and appreciating the contribution of various cultures to the development of mathematics. In the context of developing inclusive mathematics education, research on ethnomathematics highlights the importance of understanding the relationship between mathematical concepts and the culture of a society, confirming that mathematics is not only universal but also closely related to social and cultural contexts.

Ethnomathematics is a mathematical concept related to culture (Nursyeli & Puspitasari, 2021). Ethnomathematics is a concept in mathematics learning emphasizing the relationship between mathematics and culture. Ethnomathematics studies how mathematical concepts are reflected in the culture of a society, as well as how this culture influences the way individuals understand and use mathematics in everyday life, which can make a significant contribution to understanding mathematics learning (Faqih, Nurdiawan, & Setiawan, 2021). Etymologically, the term ethnomathematics comes from English, which consists of three words: "Ethno," "Mathema," and "Tics" (Fitriyah & Syafi'i, 2022). "Ethno" refers to the socio-cultural context, including customs, community culture, myths, and societal symbols (Mulyani & Natalliasari, 2020). Meanwhile, "Mathema" is defined as explaining, knowing, carrying out activities, measuring, and concluding. "Tics" comes from the word "techne," which means Technique. In the context of the term, ethnomathematics is considered a cultural anthropology of mathematics and mathematics education (Turmudi, 2019; Puspasari, Rinawati, & Pujisaputra, 2021). So, etymologically, ethnomathematics can be interpreted as the study of mathematical knowledge in a particular culture or social group. Although mathematics is often considered abstract and separate from everyday reality, awareness of this concept highlights the importance of relating mathematical material to practical applications in everyday life, increasing students' relevance and understanding of the subject.

Mathematics is often considered far from the reality of everyday life because it uses more concepts and theories (Masfufah & Afriansyah, 2021). Therefore, it is essential to integrate elements of community culture into mathematics learning, known as ethnomathematics. The main goal of ethnomathematics is to recognize variations in perspectives in mathematics by considering the mathematical knowledge developed by society's culture. Ethnomathematics-based mathematics learning also aims to help students transform cultural values to build national character (Romadoni, 2017; Rhamdania & Basuki, 2021). The ethnomathematics learning process is carried out within the local community, and the relationship between learning and community culture is very close (Nurfadilah & Afriansyah, 2022). Therefore, ethnomathematics is considered an appropriate solution to integrate into the learning process. In the context of the effectiveness of ethnomathematics in mathematics learning, cultural integration in mathematics learning has a positive impact on students' understanding of the learning material. So, it can improve students' understanding and knowledge of mathematics (Fauzi & Lu'luilmaknun, 2019). One of the culinary delights in Indonesia in the manufacturing process, which has a mathematics learning concept, is Pempek, typical of Palembang.

Pempek Culinary experienced significant development in 1980 (Amin, 2021). Pempek Culinary indeed experienced significant development in 1980. This shows that at that time, pempek may have experienced an increase in popularity or changes in the manufacturing process, or there could have been innovations in the variations of pempek on offer. In the same period, the data shows that the percentage of hotels and restaurants in Palembang that serve pempek ranges from 44.4% to 66.7% (Astawan, 2019). An increase in interest in pempek culinary delights can also be seen ahead of Hari Raya, as seen from cargo deliveries from Sultan Mahmud Badaruddin II International Airport in the form of pempek food packages. Thousands of pempek pellets were sent to native Palembang residents who were overseas, even setting a record for the most deliveries, reaching 7 tons per day (Anita, 2019). This phenomenon makes pempek culinary delights popular with various levels of society in South Sumatra, Indonesia, and even abroad. In the middle of Palembang, a culinary sales center for pempek is known as Kampung Pempek 26 Ilir.

Many ethnomathematics studies have been conducted to explore mathematical concepts. Some of this research includes: (1) Julia Astuti (2023) with the title development of a mathematical literacy evaluation instrument based on an ethnomathematics-based multiple intelligence perspective in Palembang culture. (2) Muhammad Yusril (2023) Mahendra regarding ethnomathematics of making layer cakes. (3) Lusiana Harahap (2022) researched ethnomathematics exploration of Medan batik motifs. Even though these studies have used mathematical concepts, the difference lies in the objects studied. Therefore, the author feels very interested in continuing research on ethnomathematics exploration of making typical Palembang pempek. Research specifically on making typical Palembang pempek is considered new and has not been widely researched this year, and this title is considered the first step in this research. So, this can be used as additional insight into ethnomathematics research on making typical Palembang pempek.

This research aims to explore further mathematical concepts, especially those related to making typical Palembang pempek. The focus of the research is not only on the final product, but also on the mathematical concepts contained in the manufacturing process. This research is

expected to produce insights that can be used as learning media in the school environment. Thus, the mathematical concepts identified in making typical Palembang pempek can be applied to support mathematics learning in schools.

METHODS

In this research, an ethnographic approach was used, where researchers made observations through documentation, interviews, and literature studies related to ethnomathematics in making Pempek Khas Palembang. This qualitative research aims to describe the mathematical concepts that emerge in making typical Palembang Pempek so that it can be used as a learning medium in schools.

The research was carried out at Pempek Sentosa, located on Jl. Garu II B, Medan Amplas District, Medan City, North Sumatra. The object of research is the mathematical concepts contained in the process of making typical Palembang pempek. The research subjects were Pempek traders from the Pempek Sentosa Restaurant, which also served as an observation point. The data analysis technique follows the Miles and Huberman approach, including data reduction, data presentation, and conclusions (Ulya & Rahayu, 2020). Data reduction was done to determine the part of making typical Palembang Pempek related to mathematical concepts. Data presentation is used to provide an overall picture regarding the mathematical concepts found in the process of making typical Palembang Pempek. Conclusions regarding ethnomathematics in making typical Palembang Pempek and its contribution to mathematics learning are drawn.

RESULTS AND DISCUSSION

The process of making pempek consists of 3 parts, pempek submarine, pempek, pempek lenggang, pempek lenjer. So it can be seen in the image below:



Figure 1. Pempek Kapal



Figure 2. Pempek Lenggang



Figure 3. Pempek Lenjer

Based on the findings made in the field, traders make pempek lenjer. Therefore, the researcher only reviewed the ethnomathematics of making Pempek Lenjer. The manufacturing process is divided into four ways: mixing process, forming process, boiling process, and frying process. Based on the process found, here is how it works and its relationship to mathematics, including:

Mixing Process

In this process, 500 grams of mackerel fish is mixed with 250 grams of ice. Then, beat with a mixer for 5 minutes. Add sago up to 300 grams as the shaking progresses until evenly distributed. Once the dough is formed, transfer it to a bowl, as shown in the picture.

From the process, it can be found that there are mathematical concepts, including:

1. The concept of addition. In this concept, it is found that the weight of the ingredients is added in the mixing process, mackerel + ice + sago, where the sum is as follows: 500 grams + 250 grams + 300 grams = 1,050 grams.

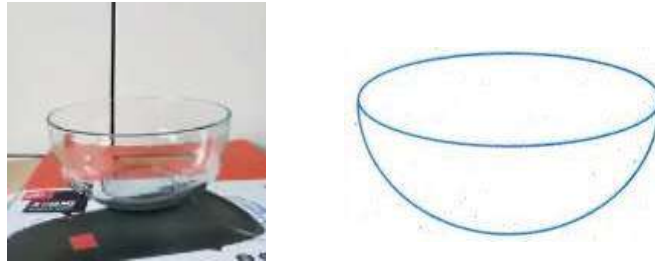


Figure 4. Cup

2. Comparison Concept. In this process, the ingredients can be compared to the measurements made in one bowl of pempek, namely fish: ice: sago, which can be made in mathematical form. $10 : 5 : 6$
3. Time Concept. This concept uses time calculations to make one bowl of pempek. The time needed to mix all the ingredients listed is 5 minutes.

Formation Process

This formation helps control the number of pempeks made so traders can make eight pempeks in one bowl. Traders carry out this process by weighing and forming tube-shaped pempek. In determining the size of each piece of dough to form pempek, it has a weight of 100 grams for each dough to form 1 pempek. Therefore, it can be seen that there are mathematical concepts contained in this process as follows:



Figure 5. Formation Proses

1. Multiplication Concept. In this process, the difference is in the number of pempek you want to make and the weight of the dough for each pempek made. That is $8 \times 100 \text{ gram} = 800 \text{ gram}$. So, it can be seen that there are mathematical concepts in it.

2. Subtraction Concept. In the previous process, the total weight of the dough should have been 1,050 grams, but after entering the forming process, the weight became 800 grams. So it can be used in mathematical fields $1.050 \text{ gram} - 800 \text{ gram} = 250 \text{ gram}$. So, weight loss occurs due to the mackerel's absorption of sago and ice during mixing.
3. Concept of Building Space. In this process, the formation of pempek lenjer is like building a tube. In this study, the height of the tube was 10 cm, with a diameter of 3 cm. The length and diameter determine the shape that looks good to consumers. According to the picture above, it can be seen that there is a tube shape in the pempek lenjer so that it can be explained in the Spatial Geometry/Spatial Building learning material.

Boiling Process

After the formation process, the next stage, namely boiling, is entered. At this stage, a pan shaped like a tube is used, and the ingredients formed in the previous process are boiled in water for 30 minutes. In this process, there are the following mathematical concepts:

1. Concept of Building Space. In this process, it can be seen that there is a mathematical concept in the container where the pempek is boiled. It is in the shape of a tube with a height of 15 cm and a diameter of 22 cm.
2. Time Calculation Concept. In this process, it can be seen that the time calculated for one boiling is 30 minutes.

Frying Process

This process is the cooking stage. Boiled pempek is then fried in hot oil in a half-sized frying pan for 3-5 minutes on low heat so the pempek does not burn. The mathematical concepts found in this process are as follows:

1. Space Geometry Concept. In this process, you can see that the frying pan used by the traders is half spherical. It can be seen that the diameter of the pan is 20 cm.
2. Time Calculation Concept. This process takes time for the pempek to cook evenly. The time needed to fry eight pempek is around 3-5 minutes.

Based on the research results above, it can be seen that the process of making Pempek Lenjer contains mathematical concepts. Making traditional cakes can facilitate students' critical thinking process and increase students' motivation in mathematics classes (Pathuddin et al., 2021). Learning mathematics using cultural contexts provides many benefits for students, namely increasing intellectual, social, and intellectual intelligence and emotional and cultural awareness (Busrah & Pathuddin, 2021). In this way, students can learn geometry contextually.

Discussion

Based on the results above, it can be seen that mathematical concepts can be linked to culture. So that besides learning mathematics, students can remember that pempek food is typical of Palembang. This research uses a learning method called ethnomathematics. So, according to the author's view, when teaching in schools, many teachers only use the lecture method. This can be seen from several students with whom the author conducted interviews. Most students need updated learning methods. In secondary school learning, teachers can develop learning material

by introducing perimeters and areas of flat shapes and geometric shapes. (Pathuddin & Raehana, 2019).

Other researchers have widely studied this method but found no one has used it. Maybe, in the author's view, it is too narrow. Therefore, the author took the initiative to use it in the future. The author carries out this method with the following steps.

1. Tell students to bring pempek to school
2. The teacher explains pempek, a typical Palembang food.
3. Then, the teacher asks students to analyze mathematical concepts in pempek.
4. After that, students were asked to report things related to pempek.
5. Then, they are collected according to the results found by the student.

Using this culture-based mathematics learning method can increase students' knowledge about culture. So, ethnomathematics-based learning methods can be applied by teachers to increase students' knowledge about culture and the mathematical concepts contained in that culture. Mathematical concepts are not only found in school but also in everyday life. Ethnomathematics research has been widely used as research material. So, ethnomathematics is no stranger to researchers. The concept of this research was also carried out by the author Muhammad Yusril Mahendra (2023), who can support this research.

CONCLUSION

Based on the research results above, it was found that there are four procedures for making a typical Palembang pempek: the mixing process, forming process, boiling process, and frying process. In this process, several mathematical concepts are discovered, including the concept of addition, the concept of subtraction, the concept of calculating time, the concept of comparison, and the concept of space geometry. The author researched this to create an ethnomathematics-based learning model.

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