



## Ethnomathematics Study: Mathematical Ideas in Malay Weaving Motifs in Pekanbaru City as A Basis for Developing Contextual Learning

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**Abstract:** Ethnomathematics is present as contextual learning that presents mathematical aspects of culture. Culture and mathematics are integrated into aspects of people's lives everywhere, including the Riau Malay ethnic community. One of the traditional arts of the Riau Malay community is songket weaving. Each region has its characteristic motifs. This study aims to explore the mathematical aspects contained in the Riau Malay songket woven motifs in the city of Pekanbaru. The data collection technique used ethnographic principles, namely: (1) interviews; (2) participant observation; (3) documentation; and (4) field notes. The subject of this research is the social situation of the Riau community in Pekanbaru City where there is a place, focusing on the production activities of the Malay Riau songket weaving motif. The findings of this study are that weaving activities have a mathematical aspect, namely the concept of flat plane geometry. This research is expected to contribute to the development of learning that uses local cultural ideas for mathematics learning in schools, especially schools in Riau.

**Keywords:** contextual learning, ethnomathematics, Malay songket weaving

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### INTRODUCTION

The education curriculum demands cultural involvement in learning in schools which aims so that students can become a generation with character and ability to maintain and preserve culture as the foundation of the nation's character. Cultural values are important to be instilled from an early age, so that every individual can better understand, appreciate, interpret, and realize the importance of cultural values in carrying out daily life. For this reason, the cultivation of national character based on cultural values in education is very essential as stated by Wahyuni, et al (2013). This is emphasized again by Ulum (2018) which states that education and culture are inseparable parts, like two sides of a coin, both of which support and strengthen each other. Culture is the basis of the philosophy of education, while education is the main guardian of culture because its role in education is shaping people to be cultured. Cultivating cultural values can be done through the family environment, formal education, and the community environment.

Mathematics grows and develops in human life. The growth and development of mathematics are motivated by the

challenges of life for individuals with different cultural backgrounds. Each culture develops mathematics in their way. This has led to the emergence of the view that mathematics is the result of thinking based on life experiences (what is seen and felt) by a group of humans. In line with Bishop (1994) stated that mathematics is a form of culture. Mathematics which is extracted based on local wisdom possessed by a group of cultural holders is better known as ethnomathematics (Nuh and Dardiri, 2016).

Ethnomathematics is a field that studies the ways people from different cultures understand, pronounce and use concepts from their culture related to mathematics, so that ethnomathematics can be studied how people understand, express, and use cultural concepts that are described in a manner mathematically (Hariastuti, 2017).

Based on the description above regarding the link between mathematics and culture as well as cultural potential in the mathematics learning approach, this study aims to explore ethnomathematics in Riau's Malay songket weaving. By examining cultural concepts that are described mathematically, it is hoped that the development of contextual

mathematics learning based on culture can be obtained.

## LITERATURE REVIEW

### Contextual Learning

Contextual learning is a learning model that links the material with the real-world situation of students. This is in line with Nanik Rubiyanto (2010) which states that contextual learning is a learning concept that helps teachers link the material students learn to make a connection between the knowledge that students have and its application in everyday life.

With the contextual learning model, the integration of culture into the teaching curriculum is a requirement of the 2016 revised 13 curricula and supports independent learning as expressed by the minister of education and culture of the Republic of Indonesia. Therefore, the researcher explores the mathematical aspects of the Malay culture of Riau which is called ethnomathematics studies. Like Abi (2017) in his writing discussing the possibility of integrating ethnomathematics into the curriculum to support learning, then Ridwan (2018) findings that in Baduy community activities in weaving activities, there is a mathematical element, namely the concept of geometry, one of them. The concept of geometry contained in this study, namely symmetry at the point, symmetry on the line, translation, flat shape, and spatial structure besides that there is a stipulation that the ratio between the functional and weft threads is 3: 2 So that researchers can carry out ethnomathematics exploration of the area of origin of the researchers, namely Riau province in the city of Pekanbaru.

### Ethnomathematics

Ethnomathematics was first introduced by D'Ambrosio, a Brazilian mathematician in 1977. D'Ambrosio in Rachmawati (2012) states that the prefix "ethno" is defined as something very broad which refers to the socio-cultural context, including language, jargon, code of conduct, myths, and symbols. The word "mathema" is defined as explaining, knowing, understanding, and carrying out activities such as coding, measuring, clarifying, concluding, and modeling. Furthermore, the suffix "tics"

comes from "techne" which means the same as technique. Whereas in terms of ethnomathematics it is defined as practiced mathematics (D'Ambrosio, 1985) states that ethnomathematics is a way to return to a foundation or basis of science. Because essentially everything in this world is a natural law, in other words, everything that currently exists returns to nature. The concept of ethnomathematics comes from an awareness of mathematical thinking or unconscious thinking. Mathematics is a product of society and it can reflect the attachment of a particular group. The relationship between mathematics and the attractiveness of a group can be examined by looking at the social construction of mathematical knowledge and also by looking at the social system in which mathematics is created and used. Scientists have long believed that scientific knowledge including mathematics originates from a real object around it.

According to Sirate (2011), there are several ethnomathematics activities, such as counting, measuring, designing activities, determining locations, playing activities, and explaining activities. Furthermore, Oray and Rosa (2006) state that the essence of ethnomathematics studies is to study anthropological culture (ethnography), mathematical modeling, and mathematics itself. The slice of the components of mathematics, mathematical modeling, and ethnography is known as ethnomathematics, where the relationship between the three can be described as follows:

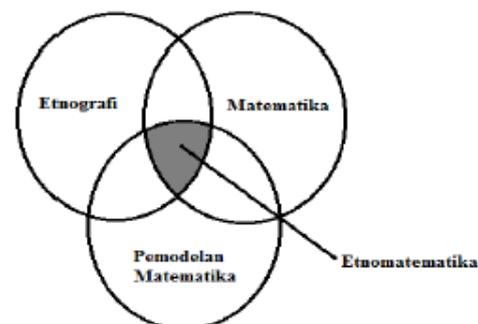


Figure 1. Etnomatematika (Rosa & Orey, 2013)

Riau Malay Songket Weaving In Pekanbaru City



Riau is a province in Indonesia that is located in the middle of the east coast of the island of Sumatra, which is along the coast of the Malacca Strait. Meanwhile, Pekanbaru is the capital of Riau province.

Riau is known to have many cultural heritages. A well-known craft in Riau is songket craft by the Riau Malay community. The person who contributed to introducing songket weaving is Wan Siti Binti Wan Karim from Terengganu, who is now in the territory of Malaysia (Zulkifly, 2009).

Songket comes from the word sungkit which means gouging where there is also a hooking process. Songket is a type of traditional woven cloth from the Malay family in Indonesia, Malaysia, and Brunei. The process of picking and hooking is the main process in weaving cloth. Songket is classified in the brocade woven family. Songket generally develops in the culture of the Malay family in Sumatra, such as Songket Palembang and Songket Minangkabau. Outside Sumatra, songket cloth is also produced in areas such as Bali, Lombok, Sambas, Sumba, Makassar, and other areas in Indonesia (Amin & Dinantia, 2016). In Indonesia, traditional fabrics have their special place, where the cloth is not only used as a means of covering one's genitals. Traditional fabrics are used in various religious activities, official events, or become a status symbol in society.

During the era of the Siak Sri Indrapura Kingdom, Siak Tenun was only allowed to be worn by members of the kingdom and their families, because the Siak Tenun was a garment that symbolized greatness and indicated the high status of a person in the kingdom, ordinary people were not allowed to wear it. The fabrics were woven using silk, which at that time was very expensive. Over time, ordinary people can also wear songket. It can be seen that every Friday, students and civil servants, and government officials wear Malay clothes that have a Riau Malay songket motif. The songket woven motif contains the philosophy of life of the Riau Malay community. A songket wearer is not only wearing as a decorative garment but also for wearing with symbols and making it easier for him to digest and appreciate the philoso

## METHOD

The main objective of this research is to explore the mathematical aspects of the Malay Songket weaving. The type of research used in this research is ethnography with a qualitative approach. Ethnographic research aims to describe and analyze culture based on field research. The data collection technique used ethnographic principles, namely: (1) interviews; (2) participant observation; (3) documentation; and (4) field notes. Meanwhile, qualitative research aims to understand the phenomena experienced by research subjects by utilizing various natural methods. The subject of this research is the social situation of the Riau Malay community in Pekanbaru City, in which there are places, actors, and a focus on the production of the Malay Riau songket weaving motif. PHY is contained in his daily life. Researchers dig up information through literature, museum visits, and observations, and interviews with informants, namely 2 weaving business owners in Pekanbaru city and 2 weaving craftsmen.

This research consists of seven stages, namely:

1. Conduct a literature review,
2. Visiting and collecting information from museums,
3. To determine the weaving house to be visited,
4. Create a list of open-ended questions
5. Dig up information through interviews
6. Make field notes and documentation
7. During the research process, the researcher identified the mathematical aspects that emerged from the Riau Malay songket woven motif in the city of Pekanbaru

The results of the seven stages will be triangulated with a literature review to determine the mathematical aspects contained in the Riau Malay songket weaving motif.

## RESULTS AND DISCUSSION

Riau Malay weaving is an authentic Malay wealth that is rich in motifs, colors, and symbols (Dinantia, 2016). Based on interviews and literature reviews, there are thousands of motives, some of which are not

well documented. Researchers discovered several geometric aspects of flat shapes. The researcher chooses several motives to

represent each shape. The findings of these flat shapes are presented as follows:



**Figure 2.** Motif Pucuk Rebung Sirih Tunggal

Authority: Malik, Effendy, Junus, & Thaher,(2003)

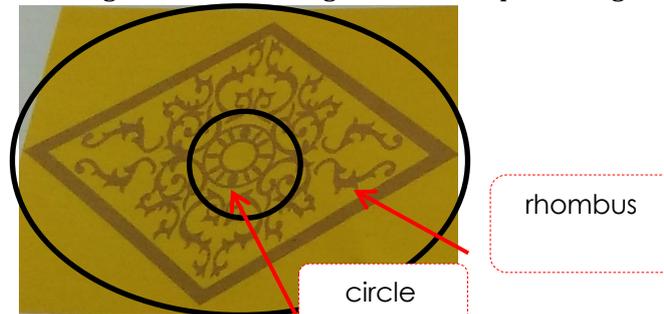
In figure 2, you can see the motif that was designed based on a triangular frame.



**Figure 3.** Motif Pucuk Rebung Bungkus

Authority: Malik, Effendy, Junus, & Thaher (2003)

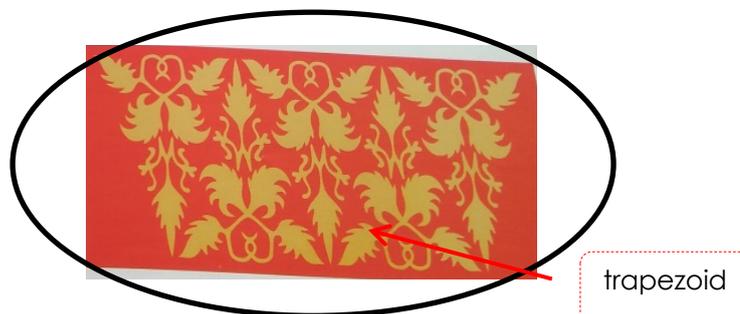
In Figure 3. You can see the motif designed from 4 triangles to form a parallelogram.



**Figure 4.** Motif Pucuk Rebung Tersamar

Authority: Malik, Effendy, Junus, & Thaher (2003)

In figure 4, You can see a rhombus that covers the motif in it, and in the middle, there is a circle.



**Figure 5.** Motif Pucuk Rebung Sirih Tunggal  
Authority: Malik, Effendy, Junus, & Thaher (2003)

Figure 5. You can see 5 isosceles triangles arranged to form a trapezoid.



**Figure 6.** Motif Daun Tunggal Mata Panah  
Authority: Malik, Effendy, Junus, & Thaher (2003)

The results show that there are geometric aspects that can be studied through the Riau Malay songket weaving motif. The findings above can be presented as material in developing classroom learning. Marsigit (2016) states that the development of ethnomathematics-based learning tools can provide solutions for mathematics teachers to innovate mathematics learning. The presence of ethnomathematics makes mathematics learning more meaningful.



Several research results related to ethnomathematics such as Syahrin, Turmudi, and Puspita (2015), Fitriatien, S. R. (2016), Richardo, R. (2017) have stated that the use of various real contexts can make learning more meaningful for students.

Students can be asked to find what shapes are contained in the weaving motif by displaying a picture of the weaving motif, for example:



Authority: Personal documentation

## CONCLUSION

Based on the discussion, it can be concluded that the geometric aspect is contained in the weaving motif. Riau Malay weaving tends to use various variations of bamboo shoots, which are triangular. As for other motifs, several other types of flat shapes were found, such as squares, rhombuses, parallelograms, circles, and trapezoids. The teacher can take advantage of the flat shapes found in the Riau Malay weaving motif as a concrete learning resource. Ethnomathematics objects that are around us can be used to carry out innovative and meaningful learning. Although all forms of ethnomathematics, in

general, can be integrated into learning, they are not packaged properly, which will hinder the learning process of mathematics. For this reason, further research is needed to design and apply it to the learning process.

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