The exploration of ethnomathematics in the cultural heritage of Musirawas regency through ethnographic studies

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Abstract. Ethnomathematics as the crossing between culture, historical traditions, socio-culture and mathematics. As a part of an entity from Negara Kesatuan Republik Indonesia which has a diversity of cultures, it’s influenced by various civilizations, seen from the cultural heritage in Musi Rawas regency through ethnographic studies. Data collection techniques used observation, field notes, interviews and document checks. Based on the search from cultural heritage that spread across 6 sub-regency include Rumah Pangeran Roes, Makam Keramat Ka Jogel, and Raudhatus Sa’adah Mosque. The most mathematics concept in the three cultural reserves were geometric shapes in the form of space, motif and carvings.

1. Introduction
Musi Rawas Regency is one of several regencies in the province of South Sumatra. As part of the entity from Indonesia which has a diversity of cultures, it’s influenced by various civilizations, ranging from Hindu-Buddhist, Islamic and colonial. It is seen from various historical relics that can be found in various sub-districts scattered in Musi Rawas district, such as Binginjungut site in the district of Muara Kelingi, ancient mosque in Muara Lakitan subdistrict, and building Colonial in Muara Beliti District. Based on preliminary studies, relics of historical period in the form of cultural heritage are characteristic, carved artwork, building architecture that can represent a mindset that has been developed at the time. It is seen from the building's pharmaceutics, artistic ornaments, symmetrical carvings, and geometric shapes that are still relevant to the present. If observed relics of the cultural reserve contains mindset, practices that contain mathematical elements. The bridge between culture and mathematics is known as Ethnomathematics.

Ethnomathematics are mathematics that are practiced among identifiable cultural groups, such as society (ethnic group), labor groups, children of a particular age group, professional classes and so on [1]. According to Rahmawati [2], Ethnomathematics are special ways used by a particular cultural group or community in mathematics activities. Thus, unwittingly implied that the daily activities undertaken by the community are in hereditary to culture have used the concept of mathematics. Studies and research on Ethnomathematics have been conducted by past researchers both at domestic and abroad. Several studies with the topic of Ethnomathematics include: integration of local culture-based Ethnomathematics in school Learning [3], exploration of the Ethnomathematics people of Madura in Situbondo[4], an Ethnomathematics-based game in mathematics Learning [5], an
ethnomathematics of Baduy people in Arabia [1], and Remembering The Hindu festivities mathematically by the Balinese using integer operations and least Common multiple [6].

These studies describe the application of mathematical concepts in everyday life that apply in ethnic, class, or certain cultures. Considering that each group has certain cultural characteristics, especially in Indonesia which is well-known for its multicultural and rich in regional culture, the research with the theme Ethnomathematics can be one of the strategic themes. Thus, the author intends to conduct an Ethnographic Study of Exploration of Ethnomathematics in Cultural Heritage in Musi Rawas Regency. Furthermore, this research aimed to identify the Ethnomathematics objects contained in cultural heritage in Musi Rawas Regency, thus the results of this study can be used for the context of mathematics learning both basic, secondary, and high education level. Another benefit of this research is the growing awareness and spirit of individual nationality as part of a cultured society.

2. Methods

This study used qualitative traditions method that focus on ethnography. Ethnographic research is the study of natural cultural patterns and ways of seeing humans or members of certain cultural groups [7], according to Abdullah [8] ethnographic research is an empirical approach and a theory that aims to describe and analyzing cultural elements through field research. Ethnographic research has three main characteristics that focus on: 1) tracing the cultural patterns found in human habits, 2) the viewpoint of the behavior of cultural groups, 3) studying the effects of nature in which culture is manifested [9]. The flow of research follows the ethnographic research steps [7] as shown in Figure 1.

3. Result and Discussion

Bricks are found on the Bingin Jungut site, Muara Kelingi District. Bricks are made of clay, measuring 29 cm, width 17 cm, and 7 cm thick, this object is part of the walls of the Bingin Jungut Temple, a Buddhist temple inherited from the classical period 9-13 M (Hindu-Buddha). The form of bricks that are found relatively the same as the bricks that exist today are rectangular prisms or beams, but their size is relatively wider and flatter. As an illustration, the following Figure 2 shows an illustration of classic bricks and today.
The House of Pangeran Roes in MuaraLakitan Sub-district. The house was built during the Dutch colonial period in the 19th century A.D. the design of the building shows the characteristic of the Dutch colonial building with wooden construction and floor of the wall. The house consists of eight large spaces and five small spaces and is equipped with wood carvings and geometry-shaped ornament. Currently the house is Figure 3 showing the aspects of ethnomatematics found at the house of Pangeran Roes.

Figure 3. The House Pangeran Roes

Figure 3(a) shows that the house of Pangeran Roes looks ahead, the surface of the house consists of various geometric shapes including triangular, trapezoid, square and rectangular; (b) The plan of the House consists of nine spaces, namely the family room, room and living room, the shape of the square and rectangular;

In addition to the House of Pangeran Roes, in Muara Lakitan district There are also other cultural reserve, the Raudhatus Sa’adah mosque. The mosque was built in 1938 during the Islamic period, based on the story of local people the mosque was in the architecture of President Sukarno when he was exiled in Bengkulu. The draft of the mosque was awarded by President Sukarno to Pangeran Roes. Figure 4 shows the buildings and towers of Raudhatus Sa’adah mosque.

Figure 4. The Buildings and Towers ofRaudhatusSa’adah Mosque

Figure 4(a) showing the building of the mosque with a pyramid-shaped roof, this form is characteristic of buildings in the province of South Sumatra. The tower of the mosque picture 4(b) is a blend of three spaces, namely the base of the cube (resembling the Kaaba), the middle part of the limas is truncated,
and the upper part is a form of half a ball. In addition to the mosque building that closely relates to the concepts of geometry, the interior of the mosque enriched with ornament or carving that shows the prehistory of Islam at the time.

The tomb of Keramat Ka Jogel is the result of exploration of cultural reserves in the region of exorbitant subdistrict, this tomb is sacred to the people, because at the time Ka Jogel is a man in the exorbitant region and is a descendant of Majapahit and NyiLoroKidul. It is interesting that the tomb of Ka Jogel is a barrier fence made of wall with a hexagon shape with the number of pillars in each side as much as 7 pieces. The identification object etnomathematics formal and object in mathematics presented in Table 1.

| No | Ethnomathematis Object | Formal Object | The Identification |
|----|------------------------|---------------|--------------------|
| 1. | Object: Bedug at RaudhatusSa’adah Mosque | ![Tangent Line of a Circle](image1.png) | a. Ethnomathematics Object: Can be used as a context in tangent line of a circle learning  
b. Basic Competence: Determine the equation a tangent a circle in a variety of situations. |
| ![Bedug](image2.png) | A tangent line of a circle |

| 2. | Object: Mihrab in the mosque of RaudhatusSa’adah | ![Area Under Curve](image3.png) | a. Ethnomathematics Object: Can be used as a context in integral learning.  
b. Basic Competence: Determine the area of the below curve using integral |
| ![Mihrab](image4.png) | Area under curve |

| 3. | Object: The Tomb of Keramat Ka Jogel at Selangit | ![Tomb](image5.png) | a. Ethnomathematics Object: Can be used as a context in triangle learning.  
b. Basic Competence: Determine the area of a polygon |

| ![Tomb](image6.png) | |
No | Ethnomathematis Object | Formal Object | The Identification |
---|------------------------|---------------|--------------------|
 | The Tomb of Keramat Ka Jogel | Ten isosceles triangle | Formed of an isosceles triangle |
 | | | |
| 4 | Object: The house of Pangeran Roes in Muara Lakitan | Rectangular | a. Ethnomathematics Object: Can be used as a context in rectangular learning | b. Basic Competence: Determine the area and circumference a rectangular |

Based on the exploration conducted by researchers, buildings or ornament in the cultural reserve can be explained the application of mathematical concepts conducted by the society in the time in other words ethnomatematics. Ethnomatematics found in cultural reserves could be utilized as a context in mathematical learning, it is as suggested by D’ambrosio in 1984 according to Barton [10] that mathematics education must integrate cultural roots, process the culture, so that students can know the natural and social environment around it. This is reinforced by the results of the study [11] that the integration of cultural-based contexts in mathematics learning enhances student problem-solving skills.

4. Conclusion
Cultural Reserve in MusiRawas District can be divided into three periods, namely Classical period (Hindu-Buddhist), Islamic period and colonial period. Every relic in each period can be explained mathematically. This means that the people of the time have been pressing the mathematical concepts seen in buildings and ornament geometry or ethnomatematics. Cultural heritage in the surrounding area must be socialized through the use of mathematical learning contexts so that students become part of the nation of character who appreciates the culture. Researchers hope readers are inspired to make ethnomatematics a mathematical learning context.

5. References
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