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Ethnomathematics Exploration of Cemetery of Heroes in City Kampung Mesjid Labuhanbatu Utara

Sugi* and Joko Soebagyo
Pendidikan Matematika, Universitas Muhammadiyah Prof. Dr. Hamka, Jakarta, Indonesia
**sugip930@gmail.com*

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Abstrak

Ada keterkaitan antara pendidikan dan budaya, hal ini setiap daerah yang terdapat sekelompok manusia yang menetap menjadi masyarakat akan timbul suatu budaya baik itu warisan para leluhur maupun timbulnya budaya baru akibat interaksi manusia. Etnomatematika sebagai penghubung antara pendidikan dan budaya dalam hal ini terfokus khususnya pada bidang matematika, baik secara sadar maupun tidak masyarakat telah mengadopsi konsep-konsep matematika dalam kehidupannya. Penelitian ini hadir untuk mengulas eksplorasi etnomatematika situs warisan bersejarah yaitu Makam Pahlawan sebagai bentuk partisipasi masyarakat Kualuh Hilir terhadap para pahlawan Kesuma Bangsa. Jenis penelitian ini adalah penelitian kualitatif eksploratif yang terfokus pada objek warisan bersejarah dengan observasi, analisa, dokumentasi, serta catatan-catatan dalam tugu monumen peresmian. Setelah dilakukan penelitian adanya konsep matematika yang dipergunakan saat pembuatan monumen bersejarah yaitu makam pahlawan. Terbukti adanya enomatematika masyarakat Kualuh Hilir yang terlihat pada bangunan situs bersejarah Makam Pahlawan.

Kata kunci: Etnomatematika, Makam Pahlawan Kampung Mesjid, Budaya

Abstract

There is a link between education and culture, this is in every area where there are a group of people who settle down as a society, a culture will emerge, both the heritage of the ancestors and the emergence of a new culture due to human interaction. Ethnomatematics as a link between education and culture in this case is focused specifically on the field of mathematics, both consciously and unconsciously the community has adopted mathematical concepts in their lives. This research is here to review the ethnomathematics exploration of historic heritage sites, namely the Hero's Cemetery as a form of participation by the people of Kualuh Hilir towards the heroes of Kesuma Bangsa. This type of research is exploratory qualitative research that focuses on historical heritage objects with observation, analysis, documentation, and notes on the inauguration monuments. After doing research, there is a mathematical concept that is used when making historical monuments, namely the hero's tomb. It is proven that there is ethnomathematics of the people of Kualuh Hilir which can be seen in the building of the historic site of the Hero's Cemetery.

Keywords: Ethnomathematics, Hero's Grave Kampung Mesjid, Culture

1. INTRODUCTION

Education is a process that is very important for human life, is a foundation for human resources in developing knowledge, skills and good thinking power. Education is a series of learning for students to be able to understand, understand, and make people more critical in thinking (Dwianti *et al.*, 2021). Culture is a system of values and ideas shared by a group of people in a certain environment and at a certain time (Putri, 2017). Culture as a form of human action and learning process, and a form of human work is a form of culture as well (Murtiawan et al., 2020). Culture is the work of humans, every time there is a group of people, a culture will be created, be it a culture from the continuation of the past or a culture that develops because of the existence of a group of people who interact with each other. From the above understanding, culture is very closely related to a group of people who have values in it.

Kampung Masjid is an area whose geographical location is surrounded by rivers and includes a coastal area, most of the people earn rice farmers and oil palm farmers in an area of 20.22 km^2 located in the Kualuh Hilir sub-district which has an area of 385.48 km^2 (Ventina *et al.*, 2017) and is located in Labuhanbatu Utara Regency. Kampung Mesjid has a hero's grave as a history of the struggle to defend the independence of the Republic of Indonesia from Dutch colonialism. Likewise, the people of Kualuh Hilir also have their own culture.

Mathematics is a science that is often used in society from the past until now, most people often do not realize that they have used mathematics in their lives (Rahmawati. Z & Muchlian, 2019). Mathematics is a subject that is very closely related to human life. The need to link mathematics learning with the surrounding environment so that students are more interested, even move their thinking skills so that students are more creative and can take advantage of the surrounding environment related to mathematics as a learning medium. Ethnomatematics is a relationship between mathematics material and culture (Imswatama & Zultiar, 2019) it would be more interesting if the learning of mathematics is associated with historical heritage sites related to culture. There is still a lack of student knowledge about the relationship between mathematics and culture or objects that contain historical values. In line with what the researchers said (Nurrosadha et al., 2021) From 15 students spread across 3 SMP/MTsN schools using Google forms and interviews, the result is that most students do not know the relationship between the concept of mathematics and culture. That's why it's important to be more active in introducing mathematical concepts to culture.

Wahyuni, *et al* (2013) said that one thing that connects mathematics is ethnomathematics. The development of student creativity can also be carried out by integrating mathematics and culture in order to foster students' ability to develop cultural heritage according to the context and based on mathematical creative thinking skills (Wulandari & Puspadewi, 2016). Of course it is not only limited to mathematical creativity but also the need for student motivation Ricardo Ricardo (2016) proves that ethnomathematics provides a learning environment that can increase good motivation and is fun and free from the notion that mathematics is scary. The presence of cultural nuanced mathematics (ethnomatematics) certainly makes a very big contribution to learning mathematics, because formal education is a social institution that is different from the others so that it allows for intercultural socialization (Zayyadi, 2017). The concept of ethnomathematics greatly contributes to the improvement of mathematics learning, because it is related to students' experiences in everyday life related to local regional art and culture so that students better understand the mathematical concepts explained (Mar *et al.*, 2021). Of course, there are many ways to teach mathematics using contextual problems related to everyday life so that students can easily understand mathematical concepts. Such as using a realistic mathematical approach showing a positive attitude towards learning activities (Syutaridho *et al.*, 2012).

One of the historical heritage sites in the Kualuh Hilir community is the hero's tomb which is located in Kampung Mesjid, Kualuh Hilir sub-district, Labuhanbatu Utara district. This historical object is a monument to the heroes of the independence of the Republic of Indonesia as a form of defending independence against the occupation of 72 Dutch troops in the village town of the mosque. TNI troops led by Captain A R. Aswandi *et al*. 4 hour attack by 140 TNI troops to defend the independence of the Republic of Indonesia on 5 June 1949 at 05.00 WIB. As a form of appreciation for the people of the Kualuh Hilir sub-district, a hero grave monument was made, which was inaugurated on August 17, 1996 by the Head of the Kualuh Hilir sub-district, Mr. Drs. Maslin Pulungan. Then a monument to the struggle for independence was erected by the people of Kuluh Hilir sub-district which was inaugurated on November 10, 1970. This is from the shape of the building related to mathematics, unconsciously the people of Kualuh Hilir have applied the concept of mathematics (ethnomatematics). Mathematics is a form of culture that is integrated into all aspects of people's lives (Jayanti & Puspasari, 2020).

Ethnomathematics is a study of the various ways in which people solve mathematical problems and practical algorithms on the basis of their own mathematics according to various mathematical models as a consequence embedded in cultural activities (Patri & Heswari, 2022). The aim of ethnomathematics is to recognize that there are different ways of doing mathematics taking into account the academic mathematical knowledge developed by different sectors of society as well as taking into account the different modes in which different cultures negotiate their mathematical practice (way of grouping, counting, measuring, designing buildings). or tools, play and others). Ethnomatematics raises cultural wisdom so that it can motivate students in learning mathematics.Ethnomathematics is mathematics in a culture (Sarwoedi *et al*., 2018). Basically mathematics is inseparable from the values and culture that exist in a group of people called society, of course mathematics always has a significant space in human life. From ethnomathematics researchers will examine ethnomathematics exploration of the historic site of the hero's tomb in Kampung Mesjid, Kualuh Hilir sub-district, Labuhanbatu Utara district in order to find a mathematical concept or a mathematical exploration of historical monument sites.

2. METHOD

The method uses qualitative research through an ethnographic approach. Menurut Sugiyono (2012) Qualitative research method is a research method on natural objects and is more widely used in research in the field of cultural anthropology. Qualitative research focuses on humans, objects, and institutions, as well as the relationships between these elements, in understanding an event, behavior, or phenomenon (Mohamed, Abdul Majid & Ahmad, 2010). This research focuses on in-depth observation of the object of research.

This research was conducted in the Kualuh Hilir sub-district as the object was the hero's grave monument. Observing in depth, observation, documentation, data collection, reducing, analyzing data, finding mathematical exploration, conclusions.

3. RESULTS AND DISCUSSION

For the people of Kualuh Hilir the hero's grave is a historical monument site in the struggle for the independence of the Republic of Indonesia from Dutch colonialism, not a few of the nation's heroes have fallen. As a form of community participation, a heroes graveyard was created in which there are 2 hero graves, as well as various historical monuments, cannons, etc. The concept of mathematics as a building design from measuring shapes can be seen from the hero's tomb itself.

Figure 1. Cemetery of Heroes in Kualuh Hilir

Mathematical Exploration on Historical Inauguration Inscriptions

Figure 2. Inscription of the Inauguration by the Head of the Kualuh Hilir District in 1996

A historic inscription tells of the nation's struggle as a form of participation by the people of Kualuh Hilir. From its shape, it contains the concept of a flat shape, namely a rectangle. A rectangle is a two-dimensional flat shape that has two pairs of parallel sides and has an internal angle of 900 each. The formula for the area of a rectangle is length x width and the formula for perimeter is 2 x length + 2 x width.

Figure 3. Circle shape

In addition to the inscription, there is a frame in which each corner is $\frac{1}{4}$ a circle, if the 4 corners are combined it will form a circle. The formula for the area of a circle is πr^2 if $\frac{1}{4}$ it's a circle then the formula is $\frac{1}{4}\ \pi r^2$.

Figure 4. Monument to the Monument of the Heroes' Cemetery

The monument has a block shape, namely a three-dimensional flat wake having 3 pairs of squares or rectangles with at least 1 pair of them having the same size but different from 2 pairs of other sides, the beam consists of 6 sides 12 ribs and 8 vertices. If it is constructed like the image below.

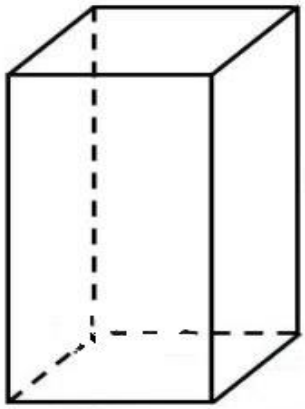

Figure 5. The shape of the beam

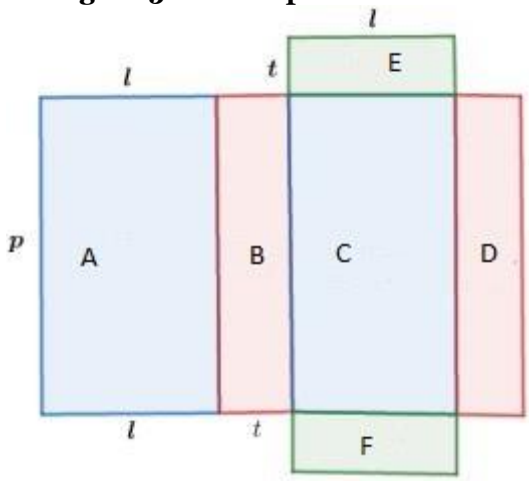

Figure 6. The shape of the wedge beam

Surface area
Wide A = Wide C = p x l
Wide B = Wide D = p x t
Wide E = Wide F = l x t
Hence the surface area = 2 x ((p x l) + (p x t) + (l x t))
While the formula for the volume of a beam = p x l x t

Figure 7. Struggle cannon

The cannon has a tubular shape. The tube is a geometric shape consisting of curved sides, having three main sides, namely the base side plane which is called the base of the tube, the curved plane which is called the tube cover and the top part which is called the tube cover.

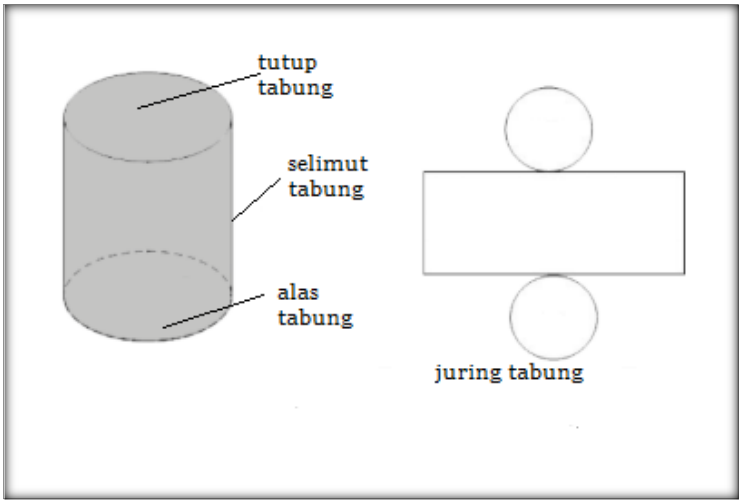

Figure 8. Tube net

Tube formula:
Base area = πr^2
Blanket area = $2\ \pi rt = \pi dt$
Surface area = base area + blanket area = $\pi d(r+t) = 2\ \pi r^2 + 2\ \pi rt = 2\ \pi r(r+t)$
Uncovered surface area = base area + blanket area = $\pi r^2 + 2\ \pi rt = \pi r(r+2t)$
Tube volume = $\pi r^2 t = \frac{1}{4}\pi d^2 t$
With :
r : fingers
t : tall
d : diameter

Figure 9. Two Cemetery of Heroes

The two hero graves consist of four headstones, if observed the tip of the tombstone is shaped like a cone and the architecture of the tombstone contains the concept of geometry.

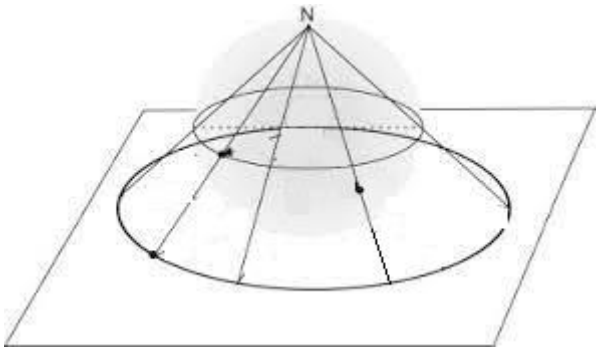

Figure 9. Two Cemetery of Heroes

If it is observed that it has a vertex N, a curved side, and a base side. The distance between the center point and the base is called the height, while the sides of the base are circular. In concept, a circle has a diameter that is half the diameter, which is called the radius. It can be calculated using the following formula.

Surface area : $(\pi \times r^2) + (\pi \times r \times s)$

Volume area : $\frac{1}{3} \times \pi \times r^2 \times t$

4. CONCLUSION

Based on the description of the discussion, there is a mathematical concept in making the hero's grave indicated by various elements in the field of mathematics in the second dimension and three dimensions. Without studying mathematics, the people of Kualuh Hilir have already applied mathematical concepts to their daily lives by applying ethnomathematics as seen from the various forms of the hero's grave site in line with the research conducted (Rahmawati. Z & Muchlian, 2019) that the Minangkabau people also apply mathematical concepts in life (ethnomatematics). Likewise research conducted (Utami *et al.,* 2020) concepts that are agreed upon and applied in the reality of life, which brings mathematics as a cultural product that has been embedded since ancient times even though they did not realize it. The ethnomathematics contained in the hero's tomb can be used as a learning medium for teachers so that students are more motivated and directly involved with

the environment around learning mathematics as well as being studied anywhere and anytime (Rohimah *et al*., 2022).

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