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The Analysis of Cultural Literacy in Ethnomathematics used by The Animaker Website at The Kramat Buyut Trusmi Mosque

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ABSTRACT

Ethnomatematics is mathematics that connects mathematical concepts with elements of culture or everyday life. This research aims to identify and describe ethnomathematics in the Kramat Buyut Trusmi Mosque building as a learning resource assisted by the animaker website. Animaker is a medium for creating explanatory videos and presentations. The research carried qualitative research with an ethnographic approach where this approach leads to observation and has a role as part of field research. Researcher played the role of planning, collecting information, documenting and also analyzing information or data, who will then choose anyone as a source of data or information. Data analysis through data collection techniques, data reduction, data presentation, and also drawing conclusions. The results of the research showed that several buildings in the Kramat Buyut Trusmi Mosque include Gapura Kori Agung which is an example of a building that contains elements of spatial plane geometry such as a rectangular pyramid on the roof of the building, a tube structure found in a water barrel located not far from the door gate, in the gate there are also geometric elements of transformation such as reflection or mirroring.

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1. INTRODUCTION

Mathematics and technology are two sciences that support and complement each other. If it is related to the application of science, mathematics and technology are also important aspects needed to fulfill human needs, such as solving daily problems, calculating, estimating contents, weight, processing, collecting data, and using electronic tools in the form of technology (Nursyeli & Puspitasari, 2021).

Technology is currently widely used, one of which is animation media in mathematics. Animation media is a range of images or graphics and a combination of components between audio-visual instruments that can move. This audio visual instrument uses sight and hearing, such as using the Animaker Website (Hapsari & Zulherman, 2021).

The Animaker website functions as a tool to convey ideas through its visual excellence and ease of use. The use of Animaker-based animation is a way of utilizing computer-based multimedia (Batubara et al., 2022) Animaker also has the advantage of being very flexible, making it possible for users to create animations according to their needs. The use of animation using the animaker website is used in mathematical and cultural concepts called ethnomathematics (Aulia Rahman et al., 2022).

Ethnomathematics is mathematics that connects mathematical concepts with elements of culture or everyday life (Arwanto et al., 2021). According to Sri Hartanti (Aulia Rahman et al., 2022) Ethnomathematics is a field of mathematics that studies certain groups or societies. These groups include ethnic groups, nationalities, workers, children within certain age ranges, professionals, and others. Ratriana (Subarinah et al., 2022) Ethnomathematics in mathematics learning is a trend that needs to be developed, especially in learning that highlights local culture. Mathematics and culture have a very close relationship, so the development and application of mathematical concepts in the learning process must be based on daily life situations or local culture.

Understanding mathematical concepts with cultural elements in depth, cultural literacy can be a supporter in supporting understanding of cultural diversity in this case in accordance with research conducted by (Safitri & Ramadan, 2022) that cultural literacy is a deep understanding of cultural aspects such as, language, customs, values, norms, food, art, and daily life practices inherited by certain human groups.

Research on historical buildings conducted at the Al-Alam Marunda Mosque which was researched by (Faturrahman & Soro, 2021) resulted that the Al-Alam Marunda Mosque apparently has a cultural relationship with mathematics learning, especially the concept of ethnomathematics. The ethnomathematics innovation applied at the Al-Alam Marunda Mosque allows the discovery of mathematical concepts in the field of geometry.

The demographic diversity of Cirebon's population produces cultural diversity in the area (Dienaputra et al., 2021) such as in the historic building of the Kasepuhan Palace, where this research was conducted by (Wulandari et al., 2022) which resulted in the Kasepuhan Palace having a mathematical concept, namely the concept of reflection geometry in Kasepuhan Palace entrance. The existence of other cultures in Cirebon is reflected in one of the villages, namely Trusmi Village.

Trusmi Village, which is located in Plered District, Cirebon Regency, has been divided into two, namely Trusmi Wetan Village and Trusmi Kulon Village. Trusmi Village also has uniqueness and culture, precisely in Trusmi Wetan Village, which is 75 m to the north from the Trusmi Wetan Village Hall, namely the historic building of the Kramat Buyut Trusmi Mosque (Mujabuddawat, 2016).

According to Adimuryanto (Setiawan & Franseno Pujianto, ST., 2021) the Kramat Buyut Trusmi Mosque is the main location of worship used by the residents of Trusmi Village and is also a place to carry out cultural traditions. This mosque is also maintained and managed by the descendants of Ki Gede Trusmi until now. By applying ethnomathematics principles in mosque design, it is hoped that it can increase understanding of the use of mathematics in a cultural context, especially in the design of the Kramat Buyut Trusmi Mosque as a means for direct application in everyday life.

Based on the results of initial observations carried out on Monday 15 January 2024, apart from having cultural elements, at the Kramat Buyut Trusmi Mosque there are also mathematical concepts, namely in the field of geometry. For example, on the front of the Kori Agung gate, there is a pyramid-shaped roof, the door is rectangular in shape, and the water barrel is in the shape of a tube.

Figure 1 Gerbang Kori Agung

This research can be used as a learning resource, according to Donald P. Ely (Khaqiqi, 2022) information, topics and everything that can be learned by humans are called learning resources. In this mathematics learning resource, to help students understand mathematical concepts such as geometry. Based on this background, the author chose the research title "Cultural Literacy Analysis in Ethnomathematics Assisted by the Animaker Website at the Kramat Buyut Trusmi Mosque".

2. METHOD

This research uses qualitative research with an ethnographic approach. According to Creswell (Murdiyanto, 2020) Qualitative research is research as a process in investigating a social phenomenon and human affairs. Meanwhile, according to (Sidiq & Choiri, 2019) qualitative research can also be interpreted as

a way of finding a meaning, understanding, concept, characteristic, symptom, symbol or something that describes a phenomenon, this research is natural and holistic which prioritizes quality and this research presents the results narratively in the context of scientific research. Then ethnography is an in-depth study of behavior that occurs naturally in a culture or certain social group to understand culture (Abdussamad, 2021). According to Moleong (Setialesmana et al., 2020) the ethnographic approach is an approach that leads to observation and has a role as part of field research. This approach focuses on how the local community coordinates culture in the minds of that community.

Based on the explanation above, it can be concluded that Ethnography is a qualitative research approach whose focus is on the culture of the local community which is repetitive but constant and regular. The ethnographic approach also focuses on observation to study a community group. This research also describes the culture that exists at the Kramat Buyut Trusmi Mosque. This data analysis technique uses data collection techniques, data reduction, data presentation, and also drawing conclusions. Then presenting the data includes arranging the data and categorizing the data to determine whether it belongs to the relevant geometric concept. After the data is presented, the next step is the process of creating an Animaker website as an assisted application to present ethnomathematics concepts at the Kramat Buyut Trusmi Mosque and the results of the data analysis are presented in the form of a description.

3. RESULTS AND DISCUSSION

3.1 Integrate local cultural aspects into the presentation of mathematical concepts

a. Gerbang Kori Agung

According to the Big Indonesian Dictionary (KKBI), a gate is a gate used to access a house's yard (road, garden, etc.). Gapura is also a gate made as a sign of respect (Aulia Rahman et al., 2022) Gates can also be made of wood or steel. The Kori Agung gate itself is one of the main doors to enter the area of the Kramat Buyut Trusmi Mosque. This gate is surrounded by a red brick wall approximately 1.6 meters high, and the roof is around 1.5 meters high. The Kori Agung gate contains mathematical concepts in the field of geometry such as, flat square shapes on the tiles, on the door leaf there is also the concept of transformation geometry, namely reflection, and there are also tube shapes found in water barrels which have a water barrel height of 70 cm, and space shapes rectangular pyramid on the roof.

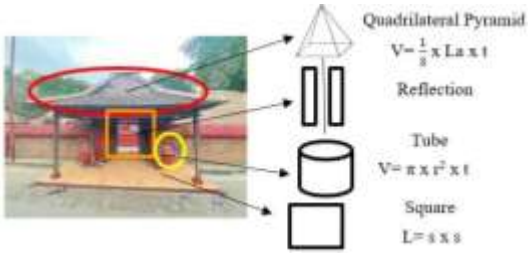

Figure 2 Gerbang Kori Agung

b. Kuta Hijab

The term "kuta" in Sundanese can be interpreted as a fence, which is a characteristic of local culture. Meanwhile, "hijab" is a covering. So actually the kuta hijab is a dividing fence between the buildings inside the mosque and those outside the mosque, so that people outside the mosque cannot see what is inside. According to the Department of Education and Culture (Mujabuddawat, 2016) it is said that the kuta hijab functions as a dividing wall or barrier wall. Kuta hijab has geometric elements, namely, half circles and hexagons. The Kuta Hijab building is 0.5 m wide, 3.90 m long and 2.80 m high and is decorated with a small monument.

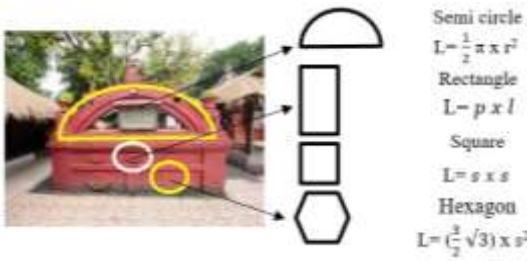

Figure 3 Kuta Hijab

c. Bale Pakuncen

The meaning of bale or hall is a house or building where many people gather, while Pakuncen itself is a term for a caretaker. Bale Pakuncen usually functions as a place for kiai or caretakers who wait for guests or rest. Bale Pakuncen has a mathematical element, namely parallelism. Parallelism is two or more lines that lie in the same plane and no matter how long the lines are, they will never meet or intersect.

Figure 4 Bale Pakuncen

d. Pendopo

The pavilion comes from Javanese culture which is a traditional building that is used as a multi-purpose venue, if at the Kramat Buyut Trusmi Mosque it is a place to wait for guests who come on pilgrimage to the Kramat Buyut Trusmi Mosque. In this building there are geometric elements, namely the roof which uses welit is cone-shaped, and also the bale is cube-shaped with four pillars supporting it. This building has a rectangular shape measuring 5 x 3.25m with a til e floor.

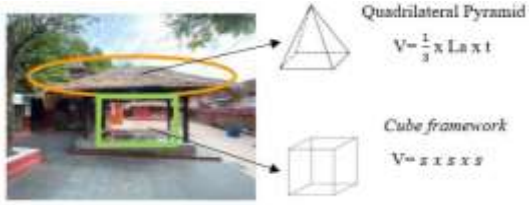

Figure 5 Pendopo

e. Tempat Wudhu

The ablution place is located next to the mosque building, intended for ablution for kiai, kuncen, or guests who make a pilgrimage to the mosque. The ablution place has geometric elements, namely the structure of a tube with a lid, the lid of the tube is circular. The water barrel used for ablution has a diameter of 50 cm and the height of the water barrel is 25 cm.

Figure 6 Tempat Wudhu

f. Sumur Kramat

The sacred well is usually used to bathe guests or pilgrims who come to the mosque. This well has geometric elements, namely the shape of a tube.

Figure 7 Sumur Kramat

g. Atap Luar Masjid

The outer roof of the mosque can be seen from the first time you enter the mosque. This building has elements of geometry, namely the base is a cube and the roof is a rectangular pyramid, and also fractal geometry on the roof where the concept is that the pattern never ends and has a similarity to itself.

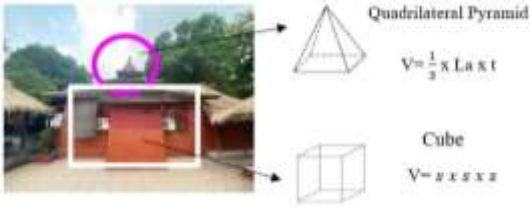

Figure 8 Atap Luar Masjid

h. Atap Dalam Masjid

The roof in the mosque has geometric elements, namely a flat square shape and a trapezoidal flat shape. The design combines a flat rectangular shape which gives the impression of symmetry and balance, as well as a trapezoidal flat shape to add dimension and dynamics to the overall structure.

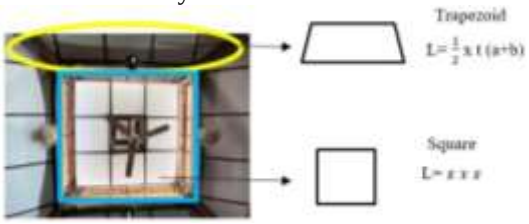

Figure 9 Atap Dalam Masjid

i. Bedug Masjid

The mosque drum is located in the mosque foyer, the drum functions as a marker for prayer time. In the mosque drum there are geometric elements of geometric shapes, namely tube shapes. According to information from Kiai Sutopo, the mosque's drum has a diameter of 80 cm.

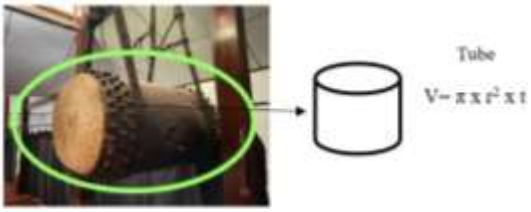

Figure 10 Bedug Masjid

j. Ruang Utama Masjid

The main room of this mosque has two important elements, namely the pulpit and mihrab of the mosque. The pulpit and mihrab function as a place for sermons and to guide the direction of the Qibla. Apart from that, the pulpit and mihrab of the mosque have a geometric concept, namely half a circle, triangle and rectangle.

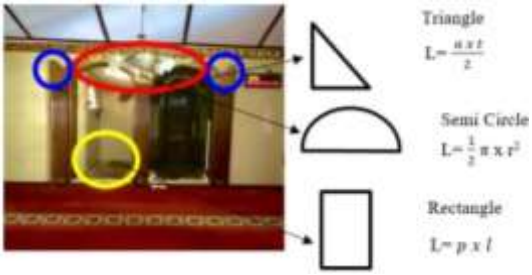

Figure 11 Ruang Utama Masjid

k. Jinem

Jinem has two sides, namely in the west or usually called west jinem and also on the other side, namely east jinem or called jinem wetan. The jinem building contains geometric elements such as those found on the outer roof of the mosque, namely the rectangular pyramid structure, the cube structure and the flat square structure on the bamboo fence.

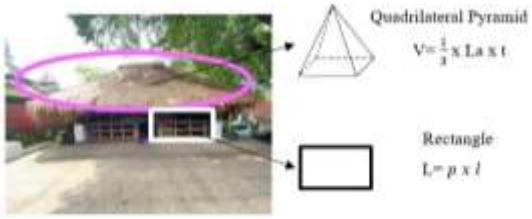

Figure 12 Jinem

l. Batu Pendadaran

Pandadaran Stone is a stone consisting of 17 stones, according to information from Mr. Kuncen Wita, the philosophy is to see the fate of each individual, in other words what the fate of that individual is. So in this life you should not force yourself to move forward if you are not able to, because each person in this life already has a destiny from Allah SWT.

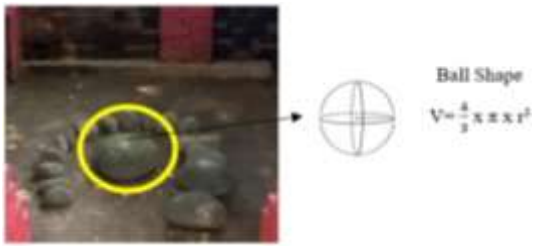

Figure 13 Batu Pendadaran

m. Witana

The name Witana comes from the word "*awit ana"* which means beginning to exist, this building was first built by Mbah great-grandfather Trusmi and at that time it was used as a prayer place for the first time, before the mosque was built, this witana was used as a place to broadcast the Islamic religion to the public around. Judging from the building, this witana is similar to a pavilion which is also a gathering place.

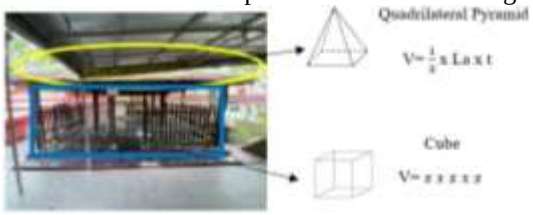

Figure 14 Witana

n. Pekulaan

Pekulaan is a pool with a depth of up to 7 meters. Pekulaan pools are often used for ablution, namely as a ritual of cleansing oneself before performing prayers. Pekulaan also contains mathematical elements, namely the pool is cube-shaped, it also contains fractal geometry which is visible when the water in the pool is not full.

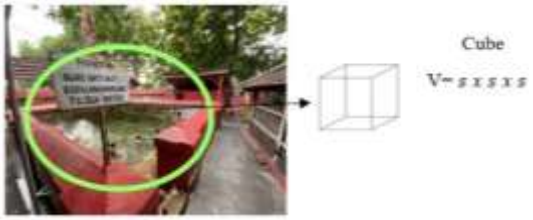

Figure 15 Pekulaan

3.2 Application of Animaker website technology to ethnomathematics at the Kramat Buyut Trusmi Mosque

The application of the animaker website in relation to the ethnomathematics of the Kramat Buyut Trusmi Mosque is as follows:

a. Slide 1: contains the title, name that presents ethnomathematics with the animaker website.

b. Slide 2: contains the history of the Kramat Buyut Trusmi Mosque.

c. Slide 3: contains an opening or introduction to ethnomathematics content.

d. Slide 4: contains mathematical concepts that exist in the Kori Agung gate, namely there are rectangular pyramids, cylinders and also square flat shapes.

e. Slide 5: contains an explanation of the Kuta Hijab building which has a geometric concept of flat shapes, namely hexagonal and semi-circular flat shapes.

f. Slide 6: contains an explanation of the ethnomathematics concept in the Bale Pakuncen building, namely the concept of parallelism.

g. Slide 7: contains an explanation of the concept of ethnomathematics in the pavilion.

Slide 8: contains an explanation of mathematical concepts in ablution places.

h. Slide 9: contains an explanation of mathematical concepts in kramat wells.

i. Slide 10: contains an explanation of mathematical concepts on the outer roof of the mosque.

j. Slide 11: contains an explanation of the mathematical concept of a mosque's inner roof, namely flat square and trapezoidal shapes.

k. Slide 12: contains an explanation of the mathematical concept of geometric shapes in the drum, namely tube shapes.

l. Slide 13: contains an explanation of the main building of the Kramat Buyut Trusmi Mosque, which contains rectangular, triangular and semi-circular shapes.

m. Slide 14: Explanation of the spatial shapes in jinem, namely rectangular pyramid shapes and also cube geometric shapes.

n. Slide 15: Contains an explanation of the awareness stone which contains mathematical concepts, namely the shape of the curved side of a ball.

o. Slide 16: Contains an explanation of pekulaan, the pekulaan pool contains mathematical concepts, namely cube shapes.

p. Slide 17: Closing contains thanks.

4. CONCLUSIONS

Based on the results of the data analysis and discussion previously presented, it can be concluded that the concept of geometry is found in several buildings at the Kramat Buyut Trusmi mosque. The concept of building a tube space is found in mosque drums, water barrels, and also sacred wells. There is also a cube building in the pekulaan pool. And build a rectangular pyramid space on the outer roof of the mosque, the roof of the pavilion and also the roof of the Witana building. And it can be presented with the help of the animaker website.

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