Al Khawarizmi
Jurnal Pendidikan dan Pembelajaran Matematika

journal homepage: https://jurnal.ar-raniry.ac.id/index.php/alkhawarizmi
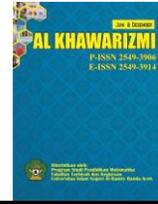
Exploration of Ethnomathematics in the ANRI (Arsip Nasional Republik Indonesia) Building, West Jakarta

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Artikel info

Abstrak

This research explores the relationship between mathematics and culture in Indonesia, focusing on the ANRI building as a cultural heritage site. The research aims to develop citizenship through understanding the informal mathematical knowledge of local people and their environment. Architectural features of the building and historical artifacts, such as the musical instrument Gong Waning, reflect geometric concepts. Ethnomathematics provides a valuable framework for understanding mathematical concepts in cultural artifacts

Introduction

Mathematics education, when culturally nuanced, plays an important role in promoting cross-cultural socialization. Mathematics is a unique social institution (Juano & Jediut, 2019). Ethnomathematics is about integrating mathematics as a cultural form into all aspects of people's lives, no matter where they live. According to (Richardo, 2020) Ethnomathematics is a science that combines mathematics and culture, helping students learn through hands-on activities that allow them to build and understand abstract mathematical concepts.

Meanwhile, according to (Mahuda, 2020) Ethnomathematics involves the application of mathematical concepts to diverse cultural groups, while ethnography refers to the study of ethnic organizations, work groups, children, and familiar classes (Ambrosio, 2012). Ethnomathematics includes not only ethnography but also the cultural anthropology of mathematics and its teaching, especially in Indonesia, a country rich in culture. Arsip Nasional Republik Indonesia (ANRI) is responsible for the maintenance and protection of 13,232 conventional archives and 8,080 new media archives in Indonesia (Wigati & Rachman, 2019). According to (*Sejarah - Arsip Nasional Republik Indonesia*, 2009) Landarchief was established by the Dutch East Indies Government on January 28, 1892. Landsarchivaris was established to keep archives for the Dutch East Indies government and

to assist in government administration. National archaeologists such as van der Chijs, de Haan, and Molsbergen contributed to Indonesian history. The government opposed the Indonesian national movement and accused the Landsarchief of obstructing freedom. The Indonesian National Archives was established after independence in 1945.

Arsip Nasional Republik Indonesia (ANRI) was established in 1971 under the leadership of Dr. Sumartini, the first woman to lead the organization. Its name was changed to Arsip Negara RIS in 1950 and its director was appointed as a professor. In addition, ANRI is also in the process of improving its quality, by organizing courses to increase the knowledge and commitment of its employees to the community. Awareness of ANRI and archives is promoted through the media. The aim is to increase understanding of archival preservation.

METHOD RESEARCH

This qualitative research used an ethnomathematics approach to study the structure, function and history of the ANRI building in West Jakarta. Data was collected through interviews, documents and observations by lay pastors. The research systematically collected, processed, and analyzed data to gain a comprehensive understanding. The focus of this research is an understanding of the structure, function, and history of the ANRI building in West Jakarta, especially on Jalan Gajah Mada. One of the tour guides at the ANRI (Arsip Nasional Republik Indonesia) Building in West Jakarta. This research used interviews, document analysis, and observation to collect qualitative data. Data were analyzed over time and irrelevant information was reduced, resulting in a structured analysis. This research explores the informal mathematical knowledge of local communities, with a focus on ethnomathematics and cultural heritage, particularly with regard to mathematics found in cultural heritage buildings

RESULT AND DISCUSSION

Figure 1: The ANRI Building's

According to (Azmi, 2014) the National Archives of the Republic of Indonesia (ANRI) is the custodian of Indonesia's diverse archive collections from the colonial period to

independence. The National Archives Building in West Jakarta, located in front of and behind the historic Dutch East Indies building, is a cultural heritage site with exhibits on two floors. The ground floor displays large gongs, cabinets and weapons, while the second floor is the general's residence. The building also has a large courtyard for outdoor events. In the background, a new four-storey building serves as the Ir Presidential Archives. The National Archives building is classified as a static archive under the Digital Archives Act of 2009. Static archives are essential in the service sector, support work within the unit and for purposes outside the institution, and can be used in certain situations (Pudyastuty, 2018).

Well-managed information and data management can support an organization's business units in carrying out their primary missions and providing efficient services to those in need. Rapid growth in organizations leads to the creation of many archives. This leads to uncontrolled hoarding of these archives. Uncontrolled records are often ignored by managers. As the number of storage locations increases, processing operations become more complex due to factors such as staff shortages and inadequate compensation.

According to (Surtikanti, 2020) the National Archives of the Republic of Indonesia manages archival materials overseen by provincial, regional, and university archives and is a non-ministerial administrative institution.

The Indonesian government makes various efforts to protect cultural heritage from destruction, including natural, biological, and physical disasters, as well as acts of terrorism, espionage, sabotage, war, and vandalism. Fire is one of the major disasters that has caused many casualties. Archival institutions are responsible for maintaining and preserving these historical documents in accordance with applicable regulations.

Arsip Nasional Republik Indonesia should prioritize the preservation of static archives, including the development of disaster plans, staff training, and firefighter awareness to ensure the safety and preservation of national cultural heritage. The researchers found various geometric shapes in the National Archives building. One of them is the shape of the building itself. According to (Faturrahman & Soro, 2021) Geometry is the study of points, lines, angles, planes, spaces, and two types of shapes: planes and geometric shapes.

Figure 2: Building Sketch

The rectangular National Archives building with a trapezoidal roof is currently 57 meters high and 164 meters long, although its width has decreased over time. Based on this research cited from the magazine (Mardiyah & Budiarto, 2019) Square, rectangle,

quadrilateral, parallelogram, trapezoid, kite, and rhombus, have 2 pairs of equal length sides and all equal sides with right angles.
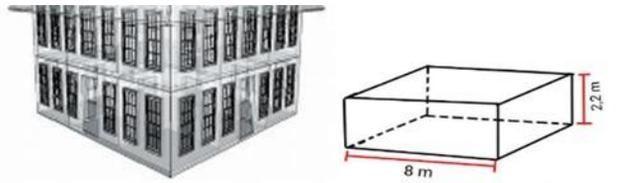

Figure 3: ANRI Building Form

According to (Fajri, 2023) A beam is a flat rectangle with three pairs of sides and 8 corners. The main hall column, 57m high and 164m long, has a cubic area of $2 \times p \times l \times t$. Quoted from (Fajarwati et al., 2021) journal Certain characteristics of the geometric shapes of the blocks were identified by Purnomosidi, Safiroh, and Gannny (2018):

a. 12 ribs.
b. 6 congruent sides with 3 pairs of parallel sides.
c. 8 vertices.
d. 12 side or diagonal faces.
e. 4 intersecting space diagonals of equal length.
f. Each quadrilateral has 6 congruent diagonals.

Figure 4: ANRI Roof Shape

The ethnomathematical roof of the ANRI building shows the different spaces of the building, forming a trapezoid with six and twelve sides, corresponding to an isosceles trapezoid. sifat- sifat trapezium sama kaki yaitu:

a. Two sides are parallel.
b. The corresponding sides have equal angles.
c. The sum of the sides of the angle is 180°.

Despite its shape, the National Archives building is home to many historical artifacts, including flat geometric shapes and landscapes:

1. Circle shape of the Waming Gong

Figure 5: Gong Waming

Gong Waning is a traditional musical style from East Nusa Tenggara, featuring gong, wane and sa'ur instruments that were once used in ceremonies, but are now a performing art.

The geometric concept of the roundabout is revealed in the analysis of the shape of the Waming Gong. by (Sitanggang, 2021) A roundabout is a curved line connecting two ends. All points are equidistant from the center, as shown in the image:

1) There are no one-sided angles.
2) Axis of symmetry and infinite rotation.
3) Point O is the center.
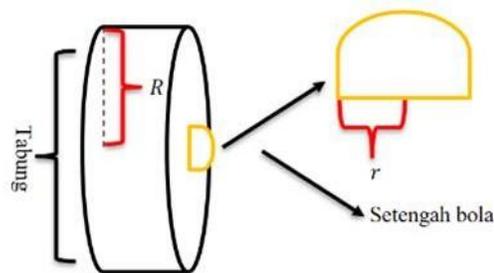4) Equidistant points A, B, C are called radius (r).

Figure 6: Bentuk Gong Tampak Samping

The Waming gong, a commemorative musical instrument, is designed with a combination of tubular and hemispherical shapes that enhance intonation and provide unique frequencies. The large diameter of the gong, 49 cm, affects its sound. The hemispherical shape of the gong shows the geometric concept. according to (Hendriawan & Faridah, 2022) Half a ball is half of a whole ball that has been cut into two parts that have the same size. In (Nurfadillah, 2021)'s journal, the ball itself is a three-dimensional shape that has a curved

surface, formed by a set of circles with the same radius, and has one common center point with an infinite number of circles. In the journal (Diniyati et al., 2022) Half ball has properties:

1) 1 internal center point.

2) 1 rounded side.
3) There are no vertices.
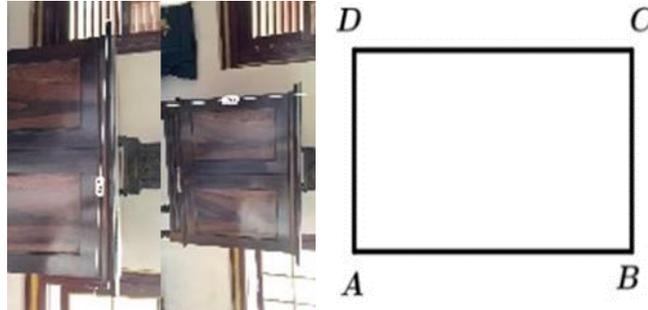4) Infinite radius.

2. Rectangular Shape on the Table

Figure 7: Rectangular Shape on the Table

Figure 7 shows a rectangular table with rectangular features. It is 1.26 m long and 77 cm wide and is used to display historical artifacts. (Juano & Jediut, 2019) A rectangle is a parallelogram with four equal perpendicular sides. According to (Ikawati & Wardana, 2022) Rectangle ABCD has 2 parallel sides and 4 right angles, with sides AB, BC, CD, and AD of equal length. The angle DAB = AB = BCD = CAD = 900°. according to (Hidayat et al., 2021) the properties of rectangles:

1) AB = CD; CA = BD.
2) Angles A, B, C, D = 90°.
3) 2 rotational symmetry, 2 folding symmetry.
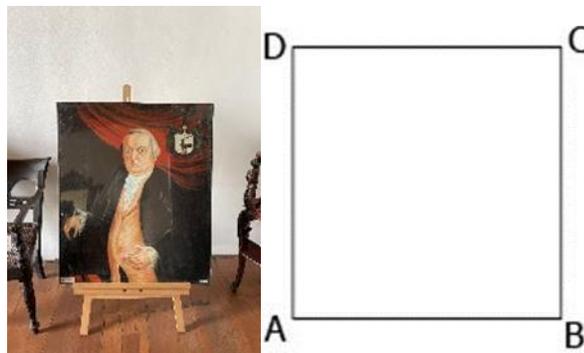
3. Square Shape in Painting

Figure 8: Square Painting

Painting is an aesthetic art form that depicts flora, fauna, humans, nature, and the environment. Figure 8 shows a rectangular table with a height of 70 cm and a width of 50 cm, with an area of 3500 cm. According to (Nurjannah et al., 2020) The characteristics of a rectangle are:

1) 90° angles and parallel sides
2) Both parallel sides have the same length.

3) Two diagonals bisect each other.
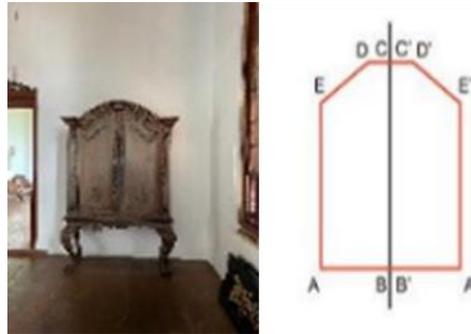
4. Reflections on Cabinets

Figure 9: Wardrobe Reflection

Mirroring or reflection according to (Nisa, 2019) is a transformation geometry that utilizes the mirroring property. While the definition of mirroring/reflection according to (Natun et al., 2021) is the nature of the mirror image of the moved position, determining changes in the plane. In addition, there are also properties of reflection according to (Fakhri Auliya, 2019) as follows:

1) Displays the same shape and size as the original.
2) The mirror distance is the same as the mirror distance.
3) Mirror image contrary to the original form.

5. Dilatation in Cabinets

Figure 10: Wardrobe Dilation

Definition of dilation according to (Manik et al., 2022) Dilation is the enlargement or shrinkage of a flat object without changing its shape. In addition, there are also functions of dilation quoted by (Matswa et al., 2021) namely:

1) If k > 1, the image is strengthened and reduced to the center of enlargement. if 0 < k < 1, then the shadow is reduced and in the direction of the center of expansion.
2) if -1 < k < 0, then the shadow is reduced and does not correspond to the center of expansion

3) if k < 1, then the shadow is enlarged, not part of the shadow and the expansion center.

CONCLUSION

From the results of observations and interviews that have been conducted by researchers at the National Archives Building, the following conclusions can be drawn:

1. A heritage site with a rich history dating back to the Dutch East Indies and the mining industry, the National Archives Building in West Jakarta.
2. The National Archives Building consists of two buildings on Jalan Gajah Mada and one building on Jalan Ampera Raya. The building on Jalan Gajah Mada is a historic building that was originally the residence of the governor-general of the Dutch East Indies.
3. The National Archives building has two floors. The ground floor has a few exhibits, while the second floor was the general's residence in the past.
4. The National Archives building has a large courtyard that is often used for outdoor events such as receptions.
5. The National Archives building also has a back building that serves as the presidential archive of Ir. Soekarno.
6. The static archives in the National Archives Building were created by their creators because they have historical value and have exceeded their retention period. The archives are kept by ANRI (National Archives of the Republic of Indonesia).
7. The National Archives Building has geometric shapes such as rectangles and trapezoids, both in the main building and the roof.
8. The historical items inside the National Archives Building also have geometric shapes, such as the circle on the waning gong and the square on the tables and paintings. There is also mirroring and dilation on the cabinets in the National Archives Building.
9. The protection and rescue of static archives is very important to maintain and preserve the historical value contained in them. Efforts must be made to maintain and preserve the archives to ensure that the information in them remains available and preserved.
10. Socialization of firefighter access and development of disaster plans are important to ensure the safety of archives in the National Archives Building

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