Ethnomathematics: Two-Dimensional Figure Geometry Concept in the Balla Lompoa Traditional House in South Sulawesi

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Abstrak

Rumah adat Balla Lompoa merupakan bangunan adat yang dulunya digunakan sebagai istana tempat tinggal Raja Gowa. Sebagai bagian dari budaya, arsitektur tradisional dan ornamen pada Balla Lompoa berkait dengan konsep geometri yang jika digali dapat dijadikan sebagai bahan ajar. Kajian tentang konsep matematika dengan praktik budaya disebut etnomatematika. Penelitian ini merupakan penelitian deskriptif eksploratif, dengan pengumpulan data melalui observasi dan wawancara dengan salah satu penjaga rumah adat Balla Lompoa. Eksplorasi rumah adat Balla Lompoa memperlihatkan berbagai konsep geometris bangunan datar seperti bujur sangkar, bujur sangkar panjang, segitiga, lingkaran, dan belah ketupat. Bentuk bangun datar ini dapat ditemukan di Balla Lompoa dan dapat menjadi salah satu bahan ajar berupa media pembelajaran, model dan pendekatan pembelajaran serta modul menggunakan Etnomatematika.
Kata Kunci: etnomatematika; rumah adat; geometri.

Abstract

The Balla Lompoa traditional house is a traditional building once used as the palace of the King of Gowa's residence. As part of the culture, the traditional architecture and ornaments on the Balla Lompoa connect with the concept of geometry, which, if explored, can be used as teaching materials. The study of mathematical concepts with cultural practice is called Ethnomathematics. This study is a descriptive exploratory study, with data collected through observation and interviews with one of the guards of the Balla Lompoa traditional house. The exploration of the Balla Lompoa traditional house shows various geometric concepts of flat buildings such as squares, square Panjang, triangles, circles, and rhombuses. This flat shape can be found in the Balla Lompoa and can be one of the teaching materials in the form of learning media, teaching models and approaches, and modules using Ethnomathematics.
Keywords: ethnomathematics; traditional house; geometry.

I. INTRODUCTION

The advancement of technology hopes that the educational curriculum can work collaboratively on culture in gaining knowledge to prepare students to become a creation with character and the ability to sustain and retain information as the nation's personality (Fajriyah, 2018). Culture and values can undeniably be ingrained in the home, society, and schools. According to Sardijiyo Paulina Pannen (in Rosita, 2019), culture-based learning is a learning approach that emphasizes students' real-life activities and encompasses different cultural backgrounds to other learners' academic achievement (Afriansyah, 2016; Meilina, Mariana, & Rahmawati, 2023). Knowledge and education are two processes that are deeply entwined in the sense of human development (Hartono & Putra, 2022).

D'Ambrosio introduced Ethnomathematics in 1989 to describe a collaboration of mathematics and culture (Sarwoedi et al., 2018; Iqrima, Zulkarnain, & Kamaliyah, 2023). Ethnomathematics is the study of mathematical ideas discovered in a cultural context. Rachmawati (in Sarwoedi et al., 2018) defines Ethnomathematics as mathematical interpretations performed by socially constructed groups. Ethnomathematics refers to the connection among ethnic and mathematical elements and constructs in games, conventions, or historic buildings.

Several ethnomathematical studies with various mathematical concepts have been performed in traditional houses (Nuqthy, Nityana, & Navia, 2022). Ethnomathematics discovery studies of the Cholo Tulung Gagon domicile revealed geometric components and mathematical concepts (Sulistsyani et al., 2019). Rusk and Padmasari (2022) unearthed not only geometric shapes and occasional designs on the adornment of the High Ridge customs house in a study of historic buildings in Bubungan Tinggi, South Kalimantan.

Balla Lompoa is a traditional house in South Sulawesi that is an artificial construct and heritage of the Gowa citizens. The infrastructure of the Balla Lompoa building is strikingly similar to the Makassar temple's traditional architecture. The architecture and decorations on Balla Lompoa interpret flat architectonic geometric concepts such as squares, rectangles, triangles, circles, and rhombuses. As a result, this article aims to investigate Balla Lompoa traditional houses, which can be utilized as learning programs for low-level geometric concepts. The outcomes are designed to aid educators in explaining mathematical concepts and incorporating traditional Balla Lompoa houses as exhibits.

II. METHOD

This descriptive exploratory study aimed to look for reduced geometric mathematical concepts inside the

architectural history and decoration of traditional houses in Balla Lompoa, South Sulawesi. The information was obtained through empirical observation of Balla Lompoa, which is in Gowa Regency at No. 48 Jalan Sultan Hasanussin. An interview session and a literature review were utilized to establish patterns between the construct of planar structural geometry and the traditional houses of Balla Lompoa.

III.   RESULTS AND DISCUSSION

Figure 1. Balla Lompoa Traditional House

Balla Lompoa, or 〰〰〰 〰〰〰 in Makassar Lontara, is King Gowa's mansion or residential. Balla Lompoa is in Sungguminasa's city center at 48 Jalan Sultan Hasanuddin, Gowa Regency, South Sulawesi. The Balla Lompoa zone is a historical site within such a sophisticated three-hectare. The pavilion of Balla Lompoa stays available, while the back of the mansion is embellished with a natural retaining wall; a concrete pillar accompanies a broad and solid wooden palisade in front.

Balla Lompoa's traditional dwellings are a well-rounded gathering for their heritage importance, treasure, or other tourmaline components. The collection contains approximately 140 slightly elevated monarch's artifacts, such as dental restorations, cuff links, toggles, jewelry, scimitars, and other items made entirely of treasure and embellished with diamonds, gemstones, and sapphires. The following geometric concepts are embedded into the architectural features and decorative items on the Balla Lompoa.

A. Square

Dinding Balla Lompoa, Balla Lompoa residences have wooden slat walls and square foundations for the main building and patios. This amulet is constructed of wood and painted white and black in the shape of a buffalo head. This beaver head represents a person's social standing. The bull's head also represents cohesiveness, inferring that households are principally united in the safeguards of their colleagues. The buffalo head symbolizes righteousness, indicating that the king's regulation must be equitable.

Figure 2. Balla Lompoa Wall

Dinging Balla Lompoa characterizes the square concept. A square is a planar structure with four equal sides and four right-angled corners (90°).

Figure 3. Square

B. Rectangle

On the left side of the Balla Lompoa is a rectangular ornament such as Sisilah or the family trees or forebears of the kings who once ruled Gowa during the Gowa Residential era or the Palontarak. A Balla Lompoa pole, also known as Tiang Balla Lompoa, serves as the house's Soko Guru. The main body of a traditional Balllompoa house comprises three parcels. The sections are in the second row of eight, right of the picture. The pillars before the entrance stairs represent the house's bodyguards or guards. The Balla Lompoa Staff is made of ironwood and is extremely powerful; it is clear that there was never a replacement staff when Balla Lompoa was erected. Rectangular windows in Tontongang or traditional houses were developed to encourage windows made more significant to permit air in and cool the room.
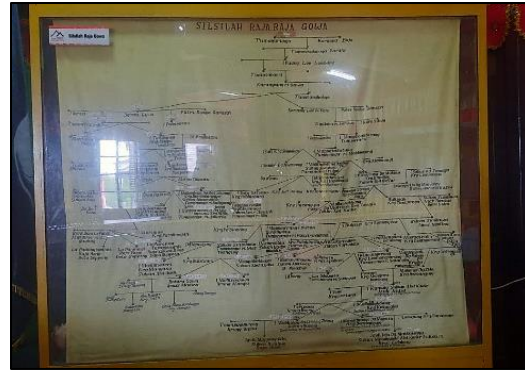

Figure 4. Silsilah, Tiang, Tontongang

A rectangular graphic is illustrated in Figure 4. A plane has always been defined by two parallel sides of equal length and four right angles. A rectangle is made up of at least two rectangles. The long side refers to the length (p), and the short side is the width (l).

Figure 5. Rectangle

C. Triangle

Pattongko 'Balla Lompoa or Traditional House Balla Lompoa The roof is triangular and consists of black partitions covering the house's main body, the front of the porch, or legos and stairs. Pattongko Balla Lompoa has a triangular shape. Plane trails consist of 3 sides with 3 points. Triangles are divided into isosceles triangles, equilateral triangles, right triangles, 180° triangles, arbitrary triangles, and obtuse triangles.

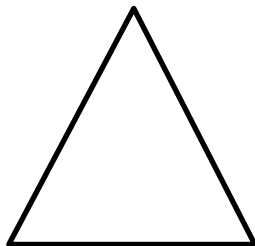
Figure 6. Pattongko' Balla Lompoa

Figure 7. Triangle

D. Circle

Benda heirlooms are the primary collection of the traditional house Balla lompoa Sungguminasa Gowa, one of which is Salokoa or the Crown of the King of Gowa. This crown was used to crown a King of Gowa since 1320, during the time of the 1st King of Gowa, flat wake Tumanurung Bailey. It weighs 1,768 gr with a shape resembling a lotus flower circle and has five leaf clusters. In addition, there is also Ponto Janga-Janaya, a bracelet shaped like a circular dragon and made of 985.5 gr gold. The number of bracelets in this balla lompoa traditional house is four pieces. The bracelet with one dragon head is called Mallimpuang, and the two-headed dragon bracelet is called Tunipattoang. The four bracelets have existed since the time of King Tumanurung. Not only jewelry but also one of the completeness of the bonding rituals used for royal birthdays/gaukang, namely Gong, is also found in the Lompoa dance.

Figure 9. Circle

Figure 8. Ponto and Gong

The outline of a circle is seen in Figure 8. The collection of all points equally spaced out from a given point forms the circle, a two-dimensional flat construction. The inside and outside of a circle are two distinct regions connected by a closed curve. The name of the circle's center point generally matches the name of the circle. The radius of a circle is the distance over which the center point and arc of the circle are connected (r). In addition, the diameter of a circle is the distance along which the circle's arc passes through its center (d). Having infinitely folded symmetry, a circle is a flat plane.
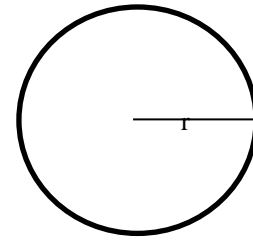
E. Rhombus

Lasugi/ Wala Suji or wala Suji comes from the word wall, which denotes a princess named Suji and divider, guard, or fence. Wala suji is a bamboo fence in ritual events that takes the form of a rhombus. Wala suji is a unit of measurement for perfection, nobility, riches, and excellent looks or beauty among the Makassar people. The rhombus-like shape of Varasuji has enormous importance for how people and nature—specifically, water, earth, air, and fire—interact. Another interpretation of Wala Suji is that it refers to these four characteristics of human creation: Lempu (determination), Getting (morality and adherence to morals), Warren (courage), and Adele (fairness). The shape of Warasuki is a rhombus. A rhombus is a two-dimensional planar structure with four equal-length sides and two pairs of angles in place of right angles, where the opposing angles have the same size. A parallelogram is sometimes referred to as a rhombus.
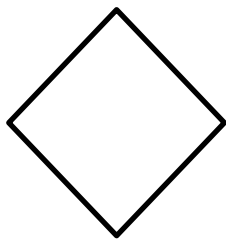
Figure 10. Wala Suji

Figure 11. Rhombus

IV. CONCLUSION

Cultural Ethnomathematics includes a variety of discussions about the Balla Lompoa Sungguminasa Gowa Traditional House. The traditional house of balla lompoa holds a collection of valuable objects not only of high value because of their historical value but also because the collection is made of gold or other precious stones. Meanwhile, the

geometric concepts based on the collection of balla lompoa objects include two-dimensional figures, squares, rectangles, triangles, circles, and rhombuses. Suggestions and recommendations from the results of this study are that by knowing mathematical concepts related to culture, an Ethnomathematics-based learning process can be integrated into the curriculum and developed in mathematics learning in schools. Learning development can be in the form of developing learning media, learning models, learning approaches and methods, and ethnomathematics-based learning modules.

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