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Exploration of Segara Wukir Temple as a source of mathematics learning: An ethnomathematics study

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Abstract

Mathematics and culture are two aspects that cannot be separated in daily life. Ethnomathematics is a bridge connecting the gap between culture and mathematics. The concept of ethnomathematics in this study aims to identify and describe the elements of ethnomathematics found in temple architecture, particularly those related to geometry and arithmetic sequences. The method in this study employs a qualitative research type with an ethnographic approach through an ethnomathematics design. The data sources used in this research were observations, documentation, and interviews. This research was conducted at Segara Wukir Temple, located in Ngobaran Beach, Kanigoro Village, Saptosari District, Gunungkidul Regency, in the Special Region of Yogyakarta, Indonesia. The results of the study reveal that Segara Wukir Temple is a cultural heritage site with high value; however, it has not been extensively researched as a source for learning mathematics. This research also contributes to the students' understanding of the application of mathematical concepts in the cultural heritage of temple architecture. In addition to enriching mathematical insights within a cultural context, this study can serve as a foundation for developing contextual, relevant, and engaging teaching materials for students.

Keywords: ethnomathematics; geometry; Segara Wukir Temple

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Introduction

As an archipelagic country, Indonesia possesses a wealth of culture that is spread across every region. Based on the cultural heritage, cultural resources become part of the legacy owned by the Indonesian nation (Riyani et al., 2022). Culture is a perspective of a group that is reflected through beliefs, behaviors, values, and symbols that are unconsciously accepted and passed down through intergenerational communication (Nada et al, 2024). The integration of culture in mathematics learning provides opportunities for students to understand that mathematical concepts are closely related to their cultural context. Furthermore, this approach plays a crucial role in preserving and promoting cultural heritage, while also enhancing students' interest in studying mathematics in a deeper and more meaningful way (Andriono, 2021; Ramadhani et al, 2023; Hayati et al, 2024).Mathematics, in essence, is influenced by history, geography, and the social environment, so it is important to relate it to students' daily lives or culture (Meyundasari et al, 2024).

Mathematics is not just a collection of numbers, symbols, or formulas that are separate from everyday life. Mathematics learning needs to be carried out concretely and applied in real life so that students can understand and appreciate mathematics in a more meaningful way (Agusta, 2020; Lisnani et al., 2024). One approach to integrating education with culture is through ethnomathematics (Mania & Nature, 2021; Pathuddin et al., 2021). Ethnomathematics connects mathematics with culture, such as its application to the concepts of geometry and arithmetic rows in the context of Temple. This approach describes the relationship between culture and mathematics (D'Ambrosio, 1985; Burkhardt, 2008; Herron & Barta, 2009; Yaniawati et al., 2024). Integrating cultural elements in teaching can inspire students and strengthen their understanding of mathematical concepts (Nuraini et al., 2022). Ethnomathematics has proven to be an effective solution to connect mathematical ideas with the cultural context and daily life of students (D'Ambrosio, 1985; Septiani, 2024).

However, mathematics learning in schools often only presents ready-made and abstract concepts and formulas (Prahmana & D'Ambrosio, 2020). By creating a culture of discourse and implementing an invention-centered learning model, teachers can help students learn mathematics in a more active, collaborative, and meaningful way (Luzano, 2024; Utami, 2024). The concept of ethnomathematics has the potential to significantly improve students' understanding of mathematics by connecting daily experiences (Siregar, et al., 2024). Ethnomathematics is a field that investigates how mathematics changes culture and serves to explain the relationship between culture and mathematics (Mania & Nature, 2021; Munthahana et al., 2023; Putra & Mahmudah, 2021; Sari et al., 2023). Ethnomathematics has been proven learning that relates mathematical ideas to the cultural context and daily life of students can be an effective solution to this problem (Parra, 2024). By incorporating cultural elements into learning, students can more easily understand mathematical concepts (Rizky & Nasution, 2024).

One of the learning media that is close to students and contains elements of mathematics is Temple. The structure of the temple has distinctive shapes and ornaments that are rarely found in Indonesia (Setiawan et al., 2018). The shape and structure of temple buildings, which

are found in various regions, show uniqueness such as carvings, patterns, layout, function, and decoration. All of this is the result of human creativity, which reflects the concept of creation, taste, work, and will in the cultural process that develops in society (Murtiawan et al., 2020). A temple is a sacred place devoted to spiritual activities, usually surrounded by walls or fences as a symbol of separation from the outside world that is considered unholy (Deta & Astuti, 2021). An example is Segara Wukir Temple, which is located on Ngobaran Beach and is used as a place of worship for Hindus (Santosa et al., 2023).

This research explores the geometric shapes in flat and spatial buildings, as well as the concept of arithmetic rows in Segara Wukir Temple. The ethnomathematical study at Segara Wukir Temple is supported by various previous studies that discuss ethnomathematics, research by (Uswah et al, 2024) analyzing mathematical concepts on flat buildings at Kerta Bhuwana Temple Giri Wilis Nganjuk, (Zhang et al., 2021) revealing mathematical concepts related to geometric elements in the architecture of the Chinese Sky Temple, (Risdiyanti et al., 2024) exploring mathematical concepts in the architectural design of the SOAS Mosque, while (Sutrimo et al., 2023) identified that each side of Gumpang Temple depicts a perfect rectangular shape. These studies show that ethnomathematics can be found in a variety of cultural and architectural structures.

Based on previous research, there have been many studies discussing Temple; however, most have only focused on simple geometric aspects. In fact, with deeper exploration, Temple has the potential to encompass various other mathematical concepts. Most previous studies tend to be limited to discussions of basic geometry. Therefore, this research explores further, not only on simple geometry but also involving other concepts, such as geometric transformations and arithmetic sequences. Thus, the exploration of ethnomathematics in Segara Wukir Temple aims to identify and describe the elements of ethnomathematics found in the temple structure, particularly those related to geometric material and arithmetic sequences.

Although Segara Wukir Temple is a cultural heritage of high value, it has not been extensively studied to date. In fact, besides being a historical site and a sacred place, this temple also deserves to be appreciated, preserved, and introduced to students. In addition to studying its historical aspects, students can utilize Segara Wukir Temple as a source of mathematics learning, considering that the ornaments of this temple contain various meaningful mathematical concepts. This research not only enriches mathematical understanding in a cultural context but can also serve as a basis for developing contextual, relevant, and engaging teaching materials for students. This approach has the potential to enhance students' interest in learning, deepen their understanding of the material, preserve cultural values and philosophies, and create innovations in mathematics teaching through activities that are relevant to culture.

Methods

This research was conducted at Segara Wukir Temple around Ngobaran Beach, which is located on the south coast of Yogyakarta Special Region. Segara Wukir Temple of Ngobaran Beach is located in Kanigoro Village, Saptosari District, Gunungkidul Regency, Yogyakarta Special Region, Indonesia. The research employed a qualitative method with an ethnographic

approach. This approach was selected as it aligns with the goals of ethnomathematics, which focuses on exploring the ideas, methods, and techniques within a specific culture from the perspective of its members. The ethnographic method entails studying a culture by observing how its members perceive, communicate, and behave, based on their own discoveries (Prahmana & D'Ambrosio, 2020). Researchers conduct in-depth inquiries, ask general questions, collect data consisting mostly of words or texts from participants, divide and analyze texts into themes, and make subjective and biased requests to generate additional questions (Safarudin et al, 2023). Field studies, which involve observation, interviews and documentation, generate data that is then abstracted and interpreted (Darmalaksana, 2020; Ahmad & Saleh, 2020).

Data collection was carried out through field studies and interviews with Mr. Mangku Parman, an Elder or Ruler of Segara Wukir Temple in the Hindu faith who has the authority to lead religious ceremonies at the temple. The literature review about temples also complements the results of this research through the process of observation and interviews. All data obtained is documented in the form of photos, videos, and field notes, then analyzed. The results of the analysis were compiled to explore various findings in this study. Data analysis involves data processing, presentation, and drawing conclusions. To get a clearer picture and make the subsequent data collection process easier, data reduction includes summarizing, selecting important elements, focusing on elements relevant to the research topic, and finding themes and patterns.

During the process of data reduction, instructions will be given based on the predetermined objectives to be achieved. During the data presentation process, the researcher aims to classify and display the data resulting from data processing, as well as gather relevant information related to the research topic. The researcher begins the exploration of ethnomathematics with four common questions that are at the core of ethnographic principles: "Where to start searching?", "How to search?", "What happens?", and "What does it mean?". After collecting data such as field notes, images, and videos, the results are analyzed to examine the connection between mathematical knowledge systems and culture. Additionally, the study also looks at the geometric concepts present in Segara Wukir Temple. Subsequently, these findings are explained in this research, as shown in Table 1.

Table 1. Design of ethnography research

General Questions	Initial Answer	Base Point	Specific Activities
Where to start looking?	The local culture of Gunung Kidul, and the architecture of Segara Wukir Temple.	Culture.	Conduct interviews with traditional leaders and local communities.
How to look for it?	Participatory observation at Segara Wukir Temple related to geometry materials.	Alternative thinking, technology and knowledge systems.	Determine what ideas are contained in participatory observation at Segara Wukir Temple related to geometry materials.

General Questions	Initial Answer	Base Point	Specific Activities
What happened?	Evidence (Results of alternative thinking in the previous process)	Philosophy of Mathematics.	Identify elements of geometry in the architecture and ornamentation of Segara Wukir Temple, understand the meaning or philosophy behind these elements- Analyze observation and interview data periodically, make descriptions of the identified elements of geometry, record interviewees' explanations of the meaning or philosophy behind these elements.
What does it mean?	Values are important to culture and value patterns are important to geometry.	Anthropologist.	Analyze the data by linking geometry elements with formal geometry concepts, hold discussions with experts or experts to gain a more comprehensive understanding of the potential of these elements as learning resources.

Results

In the Ngobaran Beach area, precisely in Kanigoro Village, Saptosari District, Gunungkidul Regency, Special Region of Yogyakarta, there is a Hindu temple called Segara Wukir Temple. This location has significant historical value because it was previously a "Prabu Brawijaya Lima" or "Prabu Brawijaya Ayam Muruk" before Segara Wukir Temple was built. This temple was first established in 1987 and has undergone two renovations, namely in 2004 and 2019. The name "Segara Wukir" reflects the location of this temple. In Old Javanese, "Segara" means "sea," while "Wukir" means "mountain," which refers to the position of the temple that is between the mountain and the sea, right on the edge of Ngobaran Beach. Based on permission from Sri Sultan, Segara Wukir Temple was built with a size of 34 x 130 meters.

Figure 1. Mandala Jonoloko, Mandala Hindroloko, Mandala Guruloko

Segara Wukir Temple consists of three main parts. The first part is "Manadala Jonoloko", which is the entrance or outer courtyard of the temple. The second part is the "Mandala Hindroloko", which is the central area of the temple. The last part is the "Mandala Guruloko", the main area for Hindu worship, where there are seven pelinggih or places of worship. The

seven pelinggih are Hyang Ismoyo, Ratu Gede, Prabu Brawijaya, Ratu Kidul, Panglurah, Hyang Baruna, and Patmasana.

The results of observations, interviews, and documentation reveal that the structure of Segara Wukir Temple contains many mathematical concepts, especially those related to geometry and arithmetic rows. These findings further support the idea that temple architecture can be used as a resource for meaningful mathematics learning, especially to introduce the principles of geometry and arithmetic rows to students. Here is a comprehensive ethnomathematical exploration focusing on the various parts of Segara Wukir Temple, including ornaments or robes on each wall of the temple building, the main section consisting of seven pelinggih, as well as three mandalas known as "Mandala Jonoloko," "Mandala Hindroloko," and "Mandala Guruloko."

Mandala Jonoloko

Mandala Jonoloko or Bentar Temple is a gate consisting of two similar buildings separated in the middle. This design reflects the concept of duality in Hinduism, namely the balance of Rwa Bhineda, which depicts two opposing but complementary forces, such as good and evil, day and night.

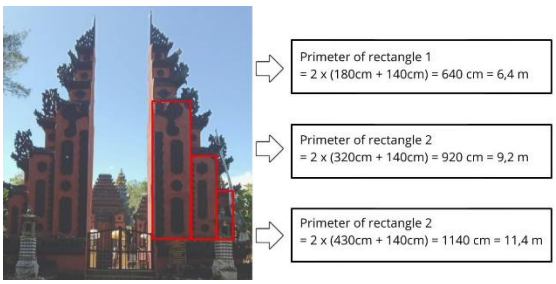

Figure 2. Ethnomathematics findings in Mandala Jonoloko

Figure 2 indicates the presence of mathematical aspects, including geometric concepts and arithmetic sequences. The body of the Bentar Temple (two gates) has the same dimensions, making them congruent to each other. Additionally, the body of the Bentar Temple forms a reflection across the Y-axis. Each level of the body of the Bentar Temple forms a rectangle of different sizes, yet maintains similarity, thus forming an arithmetic sequence that can be expressed with

Number of Elements

$$an = m.n$$
$$= 140.n$$

With the formula of the nth term is

$$an = a_1 + (n-1)d$$

Mandala Hindroloko

Mandala Hindroloko consists of three doors leading to the entrance to Mandala Guroloko. The right (apit lawang) and left (apit lawang) doors are used for the entrance of ordinary people who want to pray. Then for the middle door (kori agung) for the entrance of the priest or the gods.

For ordinary people, it is forbidden to pass through the Middle Door, unless there is a big ceremony, ordinary people can enter through the Middle Door following the Pastor or the Gods from behind.

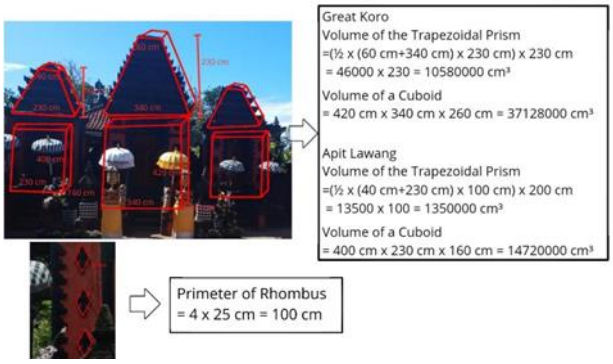

Figure 3. Ethnomathematics findings in Mandala Hindroloko

After being analyzed and measured using meters, the ethnomathematical forms of the Mandala Hindroloko building show mathematical aspects, including geometric concepts and arithmetic rows. The Apit Lawang on the right and left have the same shape and size, so they congrue with each other, and there are rectangular prism and beam shapes, and trapezoidal and rectangular flat shapes. Likewise with Koro Agung, which has the shape of a rectangular prism and beam space, and a trapezoidal and rectangular flat building. Each ornament or goro on the walls of Apit Lawang and Koro Agung forms a rhombus flat shape that undergoes translation to the Y axis.

Hyang Ismoyo Temple

In Hindu mythology, the concept of primordial times describes the close relationship between three worlds: heaven, earth, and humans. Hyang Ismoyo is tasked by Batara Guru to maintain a balance between the world of the gods, the universe, and humans. Its role is crucial in maintaining the harmony of the cosmos and ensuring the survival of all creatures.

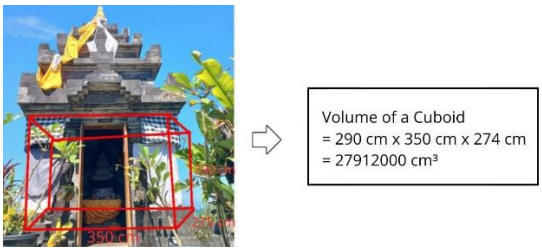

Figure 4. Ethnomathematics findings in Hyang Ismoyo Temple

The geometric shapes and arithmetic rows in Hyang Ismoyo in ethnomathematics show that the levels at the head of Hyang Ismoyo Temple have similar shapes, so they are in harmony with each other and form arithmetic rows. In addition, Hyang Ismoyo's body parts form a beam and rectangular space structure.

Ratu Gede Temple

One of the central figures in Hindu beliefs in Bali is Ratu Gede or Ratu Gede Mas Mecaling. She is believed to be the ruler of the sea or ocean around the island of Bali. In Balinese Hindu mythology, Ratu Gede is considered a protective goddess and the ruler of the ocean who is tasked with maintaining the balance of the sea around the island of Bali. Therefore, Ngobaran Temple, which stands majestically on the seaside, is the main place of worship for Ratu Gede and also for other sea lord gods.

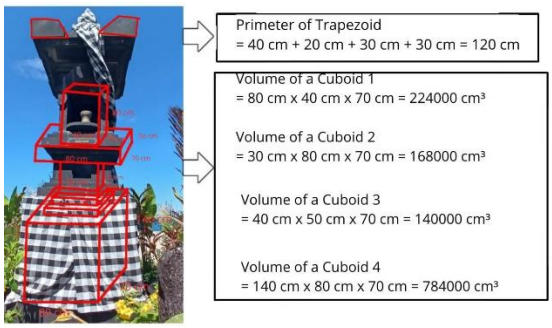

Figure 5. Ethnomathematics findings in Ratu Gede Temple

Ratu Gede Temple reflects the ethnomathematical concept based on geometry. The head of Ratu Gede Temple has an identical shape and size, indicating congruence. The body of the temple is in the shape of a block room and a rectangular flat building.

Prabu Brawijaya Temple

According to Hindu beliefs in Java, there is a close relationship between Ngobaran Beach in Bali and Mount Lawu in Central Java. It is said that Prabu Brawijaya, who was the king of Java in the past, received advice from Ratu Kidul, the ruler of the southern sea, to move from Ngobaran Beach to Mount Lawu. After that, Prabu Brawijaya performed the muksa ritual or overtime as a symbol of his relinquishment as king. This was caused by a dispute that occurred between Prabu Brawijaya and his own son.

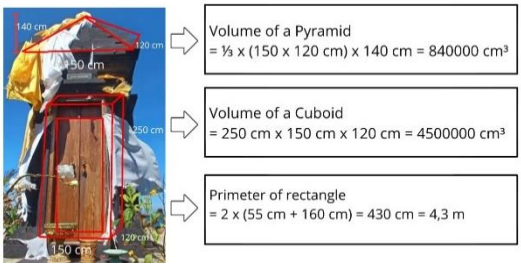

Figure 6. Ethnomathematics findings in Prabu Brawijaya Temple

Figure 6 shows that, when viewed from the point of view of geometry and arithmetic rows, the ethnomathematics found in Prabu Brawijaya Temple reflects the shape of the building of the pyramid room and blocks, while the door of Prabu Brawijaya temple is rectangular in shape. If analyzed, the roof of Prabu Brawijaya Temple consists of an arrangement of blocks with similar shapes, reflecting the harmony and forming a pattern that follows an arithmetic row.

Ratu Kidul Tmple

In Javanese belief, Ratu Kidul is the absolute ruler of the southern sea and all the supernatural beings within it. She is regarded as the protector of Java Island and has power over all water sources, including rivers, lakes, and springs. The welfare and fertility of Java greatly depend on Ratu Kidul.

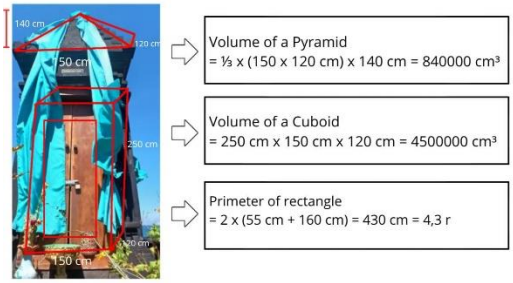

Figure 7. Ethnomathematics findings in Ratu Kidul Temple

Figure 7 reveals that, from the perspective of geometry and arithmetic sequences, the ethnomathematics found in the Ratu Kidul Temple represents the forms of a pyramid and a rectangular prism, while the entrance of the Ratu Kidul Temple has a rectangular shape. Upon analysis, the roof of the Ratu Kidul Temple consists of an arrangement of blocks with similar shapes, reflecting similarity and forming a pattern that follows an arithmetic sequence.

Panglurah Temple

In the belief of Balinese Hinduism, Ngobaran Beach is highly respected due to the presence of the Segara Wukir Temple. To maintain the sanctity of this place, the community selects a spiritual leader named Panglurah. Panglurah has full responsibility for managing and organizing all matters related to the beach and the temple.

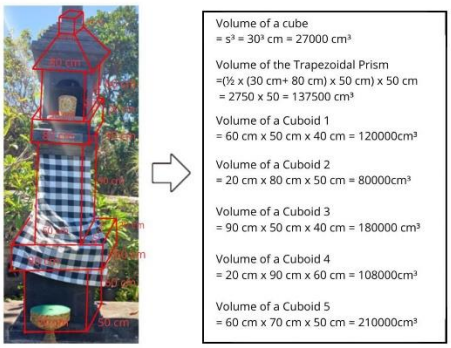

Figure 8. Ethnomathematics findings in Panglura Temple

Figure 8 shows that the Panglurah Temple contains elements of ethnomathematics based on the geometry concepts of three-dimensional shapes, such as cubes, rectangular prisms, and blocks. The levels at the top of the Panglurag temple are similar, thus forming an arithmetic sequence with the formula for the n-th term being Un=(80-4n) cm, n=$suku\ ke{-}i$, i=1,2,3, dst.

Hyang Baruna Temple

In Javanese belief, Hyang Baruna and Ratu Kidul are deities that collaborate to maintain the balance of nature in Java. The concept of "Tunggu oleh tutup" illustrates the complementary relationship between the two. Hyang Baruna, the ruler of the sea, protects fishermen and maintains the balance of the marine ecosystem, while Ratu Kidul safeguards the land of Java.

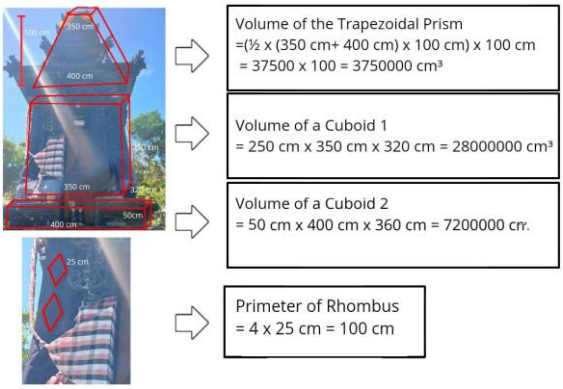

Figure 9. Ethnomathematics findings in Hyang Baruna Temple

Figure 9 illustrates the mathematical concepts present in the Hyang Baruna Temple, which includes the three-dimensional shapes of rectangular prisms and cuboids, as well as the two-dimensional shape of rhombuses visible in the wall ornaments or rhombuses of Hyang Baruna Temple. These wall ornaments or rhombuses demonstrate a translation pattern along the Y-axis. Furthermore, the door ornament of Hyang Baruna Temple, when divided in half, will create a reflection across the Y-axis and will be congruent to each other as they possess the same shape and size.

Patmasana Temple

Patmasana is a special place for worshiping the gods in religious rituals. The gods are believed to be present and reside in Patmasana during the ceremony. The process of placing the gods in Patmasana is called "dilinggihkan" or "jumengkan." As a form of respect, Hindu devotees offer offerings in the form of food and flowers. After the ritual is completed, the gods are then returned to their original place.

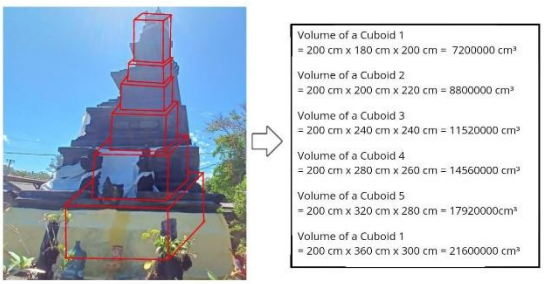

Figure 10. Ethnomathematics findings in Patmasana Temple

Figure 10 reflects the concept of ethnomathematics based on geometry and arithmetic sequences. The structure of the temple consists of three-dimensional shapes in the form of a rectangular prism and two-dimensional shapes in the form of a rectangle. The levels on the

body of the temple have similarities, indicating similarity that produces a pattern of arithmetic sequences, which can be analyzed using the formula for arithmetic sequences.
The number of elements.

$$an = m.n$$
$$= 200.n$$

Then the formula for the nth term is

$$an = a_1 + (n-1)d$$

Genta

In Hindu belief, the bell plays a very important role as a tool for communicating with God Almighty or Sang Hyang Widhi. It is hoped that the use of the bell during prayer will help Hindus become better spiritually and strengthen their relationship with God.

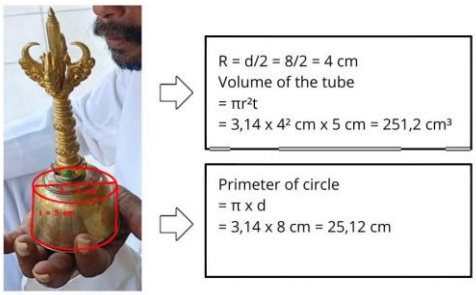

Figure 11. Ethnomathematics findings in Genta

The worship tool in the form of a bell, or known as a genta, contains mathematical concepts. Ethnomathematics in the genta is evident in its body, which is shaped like a cylindrical solid and a circular plane. Meanwhile, the claw part of the genta has the same shape and size, making them congruent to one another.

Discussion

Various mathematical ideas are contained within Segara Wukir Temple that can be integrated into mathematics education, particularly in the areas of geometry and arithmetic sequences. This finding reinforces the research results (Wahyuni, 2018) regarding Mandara Giri Temple, the study (Nurhasadah, 2019) concerning Portibi Temple, as well as the research (Murtiawan et al. 2020) on the exploration of temple architecture. This research examines the mathematical relationships within the architecture of Segara Wukir Temple, highlighting its potential as an inspiration for creating meaningful mathematics learning materials. Various elements of ethnomathematics and philosophy are present in several parts of Segara Wukir Temple.

The mathematical concepts reflected in the architecture and ornaments of Segara Wukir Temple demonstrate a structure that contains elements of geometry and arithmetic sequences. This structure includes Mandala Jonoloko and Mandala Hindroloko, which encompass concepts of flat geometric shapes, spatial shapes, geometric transformations, congruence, similarity, as well as arithmetic sequences. This research supports the findings of (Carla et al., 2024), which reveal that Ijo Temple contains concepts of spatial geometry, plane geometry, geometric

transformations, and congruence. Other structures, such as Hyang Ismoyo Temple, Ratu Gede Temple, Prabu Brawijaya Temple, Ratu Kidul Temple, Panglurah Temple, Hyang Baruna Temple, Patmasana Temple, and Genta, also contain concepts of flat geometric shapes, spatial shapes, geometric transformations, congruence, similarity, as well as arithmetic sequences. This research aligns with the findings of the study (Parajuli, 2023), which discovered that the Hindu Temple of Changu Narayan contains mathematical concepts in the form of two-dimensional (2D) and three-dimensional (3D) geometry, as well as congruence. Students can also learn mathematical concepts such as numbers, measurement, patterns, probability, and statistics through these objects (Lisnani et al., 2020; Lisnani 2024). This understanding enables students to explore a deeper meaning of the mathematical concepts being studied, allowing them to apply it effectively in various aspects of daily life (Prahmana & D'Ambrosio, 2020).

Etnomathematics offers a way to understand how mathematics is used in everyday life by different cultural groups (Siregar et al, 2024: D'Ambrosio, 2001). This is in accordance with what is stated by (Rosa & Orey, 2016; Fauzi et al., 2023; Noto et al., 2018; Kusno et al., 2024; Meyundasari et al., 2024) that mathematics, as a fundamental science, it plays a crucial role across various fields of knowledge, supporting both reasoning and practical applications, and making significant contributions to the advancement of science, technology, and culture. Students' understanding of the material will be enhanced if the material is presented in accordance with their culture. This aligns with the findings of (Anggreni, 2024), that the mathematics used by certain cultural groups and one way to teach is by introducing students to their culture, such as their traditions and local foods.

This research aligns with the findings of (Muhammad & Marsinggit, 2019), which indicate that the teaching of geometry in lower elementary school classes through an ethnomathematics approach based on Borobudur Temple in the material S1, S2, and S3 has shown positive results. By applying ethnomathematics, students can be motivated and more stimulated, thus able to overcome boredom and learning challenges while making learning more relevant (Gazali, 2016; Sunzuma & Maharaj, 2020; Deda et al., 2024). Other ethnomathematics research by (SA & Sutama, 2023) reveals that Sewu Temple contains various mathematical aspects in geometry and proportions, such as flat shapes like triangles, squares, rectangles, and trapezoids, as well as three-dimensional shapes like cubes, rectangular prisms, cylinders, and square pyramids. Furthermore, the research by (Apriandi & Ayuningtyas, 2022) demonstrates that Siwa Temple also highlights geometric concepts related to flat shapes.

Based on these findings, these results can serve as a valuable learning resource for students. The utilization of cultural heritage, such as Segara Wukir Temple, which is a place of worship as well as a historical relic in Gunung Kidul, Yogyakarta, can be developed in mathematics education to introduce various mathematical concepts. Another advantage is that students can more easily understand the concepts of geometry and arithmetic sequences while gaining insights into the cultural and historical values contained within.

Conclusion

Integrating ethnomathematics into mathematics teaching materials has significant potential to enhance students' understanding, connect mathematics with local culture, and motivate students to learn in a more engaging and relevant manner. Segara Wukir Temple integrates concepts of geometry and arithmetic sequences, making it a meaningful medium for mathematics learning. Through the ethnomathematics approach, mathematics is linked to culture, improving students' understanding by relating mathematical concepts to everyday life. There are mathematical objects in the form of flat shape concepts found, including squares, rectangles, triangles, circles, rhombuses, and trapezoids. Meanwhile, the concept of spatial forms is identified in the body of the temple building, which takes the shape of a rectangular prism, cube, pyramid, and prism. In the building roster, the concept of geometric transformation found includes translation and reflection. The concept of translation is evident in the congruent reliefs that are arranged in a row, while the concept of reflection is apparent on the entire surface of the temple, where the shapes resulting from the reflection correspond with the vertical mirror line. The concept of congruence arises from the reliefs with identical shapes and sizes, while the concept of similarity is found in the temple section with similarly shaped edges, but having a specific size ratio that forms an arithmetic sequence.

The results of this research contribute to the development of culture-based teaching materials, particularly through the utilization of cultural elements such as temples. Furthermore, these findings have the potential to be applied more broadly in meaningful mathematics learning in schools. This research is also expected to serve as a reference for readers interested in developing ethnomathematics-based learning media, by encouraging innovation and creativity to create more engaging and effective learning media. However, this research has limitations in its scope, which only covers a small portion of the ornaments of Segara Wukir Temple in exploring geometry and arithmetic sequences. Therefore, further studies are needed to explore elements from other Segara Wukir Temple to expand and strengthen the development of context-based mathematics materials.

Acknowledgment

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Conflicts of Interest

The authors affirm that there are no conflicts of interest related to the publication of this manuscript. Furthermore, all ethical concerns, such as plagiarism, errors, data fabrication or falsification, duplicate publications or submissions, and redundancies, have been appropriately addressed by the author.

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Author Contributions

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