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ETHNOMATHEMATICS IN PRACTICE: MATHEMATICAL CONCEPTS IN PANDEGLANG'S TRADITIONAL BALOK CAKE

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Abstract
The purpose of this study is to determine the relevance of Pandeglang's traditional food, Kue Balok, to mathematics learning using the Ethnomathematics approach. Ethnomathematics is one of the applications of mathematics learning related to culture. This research was conducted at Kue Balok Babakan Hj. Djamsinah located in Montor, Pagelaran District, Pandeglang Regency, Banten. The object of ethnomathematics study in this study is Pandeglang's traditional food, Kue Balok. The type of research used is exploratory research with an ethnographic approach. Data collection methods used are observation, interviews, and documentation. The results of the study indicate that mathematics learning using the traditional Pandeglang food, kue blok, as an object can be linked to geometry and flat-sided solids. The shape of the kue blok itself represents the concept of a cuboid, so it can be used to introduce concepts such as volume and surface area. Its relevance to mathematics learning lies in its potential as a contextual learning medium that can bridge students' understanding of abstract mathematical concepts. Thus, ethnomathematics in kue blok can be used to create mathematics learning that is more meaningful and relevant to students' local culture.

Keywords: Ethnomathematics, Traditional Food, Geometry

1. Introduction

Mathematics is a subject that plays a vital role in other sciences. According to Siagian (Azizah et al., 2023), mathematics is a universal and realistic branch of knowledge that plays a crucial role in the development of science and technology. It can be applied in other scientific fields and in the development of mathematics itself. Mathematics is a product of human culture, formed from human activities such as pattern-making, design, and calculation, and implemented to solve everyday life problems (Masamah, 2019). (Abdulah et al., 2023) state that the entire system of thought, values, morals, norms, and beliefs of a society constitute culture. The term used to associate mathematics and culture is ethnomathematics.

The term ethnomathematics was introduced by Brazilian mathematician D'Ambrosio in 1997. The origins of ethnomathematics according to D'Ambrosio are: The word "ethno" is interpreted as something broad that refers to the socio-cultural context, which includes language, jargon, codes of behavior, myths, and symbols. The word "mathema" tends to mean explaining, knowing, understanding, and carrying out activities such as coding, measuring, classifying, formulating, and modeling. The word "thics" comes from techne, which means like technique or method (Rosa & Orey, 2011).

Ethnomathematics is a science that studies the cultural aspects of mathematics (Rosa & Orey, 2016). According to Syafri in (Permatasari et al., 2023), in short, ethnomathematics is a form of mathematics that has been integrated into culture. Through

ethnomathematics, students can understand mathematical concepts (Fajriyah, 2018). In culture-based mathematics learning, or what is called ethnomathematics, students can understand and apply learning through the culture of their home region, where that culture has various elements such as customs, ancient buildings, art, or other elements (Lail & Budiarto, 2022). (Lail & Budiarto, 2022). Sulasman in (Lail & Budiarto, 2022) states that culture is a developed way of life that is owned by a group of people and passed down from generation to generation. Culture is a unique way for humans to adapt to the environment, while mathematics is realized because of human activity. This is in accordance with Freudenthal's phrase, "mathematics as a human activity." Haryanto in his research proved that if applied in school mathematics about subtraction of numbers, it is better for students native to the Arfak Mountains to use the abacus method, especially the Japanese abacus (Haryanto et al., 2017). Another study examined traditional West Javanese food as a source for mathematics learning. The results showed that cultural philosophy and mathematical concepts such as geometry, comparison, and linear equations are embedded in the traditional West Javanese kue blok (block cake) (Salsabila et al., 2022). Another study examined the forms of traditional snacks in the Special Region of Yogyakarta (Huda, 2018).

Traditional food or local cuisine is a type of food closely related to a region and passed down from generation to generation as part of its tradition (Purwaning Tyas, 2017). Banten Province is the western part of Java, rich in diverse cultures and ancestral traditions. These traditions are manifested in various aspects, such as art, education, economics, architecture, and even everyday (traditional) food. Pandeglang Regency is a regency located in Banten Province. In the cultural field, Pandeglang Regency is also rich in local traditions and arts, as well as typical foods that are characteristic of its people, such as the famous Balok cake.

Figure 1. Traditional Pandeglang Food: Kue Balok

Kue Balok is a traditional snack in the form of a block made from cassava and processed by pounding it with a sprinkling of grated coconut as a topping. Hj. Djamsinah's Kue Balok shop is very well known and always visited by customers. Located in Pagelaran District, Pandeglang Regency, this Kue Balok shop is one of the reasons tourists visit Pandeglang Regency. They can make hundreds of Kue Balok packages a day so the shop is always busy with customers. Kue Balok's name is taken from the cake's shape which resembles a block, namely a small rectangle that is easy to hold. In the past, people in Pandeglang and the surrounding area often made this cake as a snack to accompany relaxing time, especially in the afternoon with a cup of tea or coffee.

Based on the description above, the researcher will attempt to further explore the ethnomathematics of the traditional Pandeglang food, kue blok (block cake). This research focuses on the tools used in the process of making and serving kue blok (block cake). The researcher also observed mathematical concepts such as geometry and linear equations in the kue blok. Furthermore, the results of this study are expected to be useful for educators so that they can apply it as a learning medium in the classroom. In addition, this research is also expected to introduce students to one of Indonesia's cultures, namely the traditional Pandeglang food.

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2. Theoretical Background

2.1. Ethnomathematics

Ethnomathematics is a field that studies the relationship between mathematics and culture. The term was introduced by Ubiratan D'Ambrosio in 1997, derived from the words ethno (cultural context such as language, values, and traditions), mathema (to explain, know, or understand), and thics (from techne, meaning technique or method). According to Rosa and Orey (2011), ethnomathematics refers to mathematical practices that are embedded in cultural contexts, reflecting the ways different communities understand and use mathematical ideas in daily life.

In the educational context, ethnomathematics bridges students' cultural experiences with mathematical learning, enabling them to see mathematics as a human activity rather than an abstract discipline (Masamah, 2019). It helps students build meaningful understanding by connecting mathematical concepts to familiar cultural elements such as crafts, architecture, games, and traditional foods (Fajriyah, 2018).

2.2 Mathematics as a Cultural Product

Mathematics can be seen as a product of human culture that evolves through activities like counting, measuring, designing, and pattern making (Abdulah et al., 2023). Freudenthal's notion of "mathematics as a human activity" emphasizes that mathematical concepts originate from human attempts to solve real-world problems. Thus, mathematical learning should not be detached from cultural contexts but rather explore how mathematical reasoning emerges naturally in community practices.

2.3. Geometry in Ethnomathematics

Geometry is one of the mathematical domains most frequently found in ethnomathematical studies. It deals with points, lines, planes, and spaces, along with their relationships, sizes, and properties (Nur'aini in Choeriyah et al., 2020). In ethnomathematical exploration, geometric concepts often appear in local crafts, traditional architecture, and culinary practices. The geometric features of tools or materials used in traditional food preparation can serve as learning media to help students visualize and understand abstract shapes.

In the case of traditional foods, such as the kue balok from Pandeglang, geometric forms can be observed in the tools used (like the mortar and pestle) as well as in the shape of the cake itself. These elements embody two-dimensional and three-dimensional geometry concepts, such as flat shapes, symmetry, and solid volumes. Applying geometry to real cultural artifacts fosters contextual understanding and demonstrates the practicality of mathematics in daily life.

2.4. Ethnomathematics in Mathematics Education

Integrating ethnomathematics into classroom learning promotes cultural awareness and contextual understanding. Through ethnomathematical approaches, students learn mathematical concepts while simultaneously appreciating local wisdom and heritage. This approach also supports character education by nurturing respect for cultural diversity (Lail & Budiarto, 2022).

Several studies, such as those by Haryanto et al. (2017) and Salsabila et al. (2022), have demonstrated how traditional practices—including tools, games, and foods—contain mathematical elements that can be explored in educational settings. Therefore, exploring the mathematical structures within kue balok production not only strengthens students' conceptual understanding of geometry but also enriches their cultural literacy.

3. Methods

This research was conducted using a descriptive qualitative method with an ethnographic approach. According to Salsabila et al. (2022), descriptive qualitative research is a method or way of conducting research similar to non-experimental research, in which the type or form of the study is determined based on its objectives. Furthermore, Setiawan and Listiana (2021) state that in qualitative research with an ethnographic approach, the main research instrument is the human instrument, meaning that the researcher acts as the primary instrument who cannot be replaced or represented by others. As a qualitative study with an ethnographic approach, this research instrument emphasizes the researcher's direct role in the field. This study was used to explore in depth the kue balok, a traditional cake from Pandeglang, in relation to ethnomathematics. Therefore, it can be concluded that descriptive qualitative research with an ethnographic approach is a research method conducted to examine problems related to culture by emphasizing the analytical strength of data sources obtained through written documentation, which are then clearly and deeply interpreted.

This research was conducted at Kue Balok Babakan Hj. Djamsinah, located on Jl. Raya Labuan–Pandeglang, Montor, Pagelaran District, Pandeglang Regency, Banten 42265. The researcher chose Kue Balok Babakan Hj. Djamsinah as the research site because it is one of the few shops that still preserves traditional values in the production process, and the kue balok sold there remains authentic without any influence from external culinary cultures. The shop also allows customers to directly observe the process of making kue balok, enabling the researcher to clearly understand each stage of production—from the initial preparation to the packaging process. Another reason for selecting this location is that no previous studies have been conducted at this site.

The subject of this research consisted of the owner of Kue Balok Babakan Hj. Djamsinah. The research subject or respondent was selected using a purposive sampling technique, which is a sampling method based on specific criteria and the design of the study. The data obtained from this research were analyzed using data reduction, data presentation, and conclusion drawing techniques. According to Setiawan and Listiana (2021), data reduction is the process of transforming recorded or visual data into written form and selecting the relevant information while discarding the unnecessary data. Data presentation involves organizing and structuring the collected information so that it becomes well-organized and meaningful. At this stage, the researcher presents the data that have been reduced. After the data are presented, the next step is to interpret the data through analysis. Finally, the entire set of analytical results is presented as the representation of answers to the research questions.

4. Results and Discussion

4.1 Results

Based on the results of data collection, it was found that the traditional food *kue balok* contains significant mathematical elements, particularly in the geometric forms of the pestle and mortar used in its production process.

Table 1. Analysis Results of the Mortar and Pestle Used in *Kue Balok* Preparation

Hidden Mathematical Concepts	
Mortar	Plane and solid geometry
Pestle	Plane and solid geometry
Shape of *Kue Balok*	Symmetry

According to Nur'aini in Choeriyah et al. (2020:214), geometry is one of the branches of mathematics that studies points, lines, planes, and spaces, along with their properties, measurements, and interrelationships. Compared to other fields of mathematics, geometry is often considered one of the most difficult to understand. Therefore, a specific approach is needed to study geometric concepts in more detail namely, the ethnomathematical approach. Traditional food products rooted in local culture can be used as learning media to help students overcome difficulties in understanding geometric concepts. The geometric concepts found in the pestle and mortar used to make *kue balok*, when observed closely, resemble the forms of plane and solid figures.

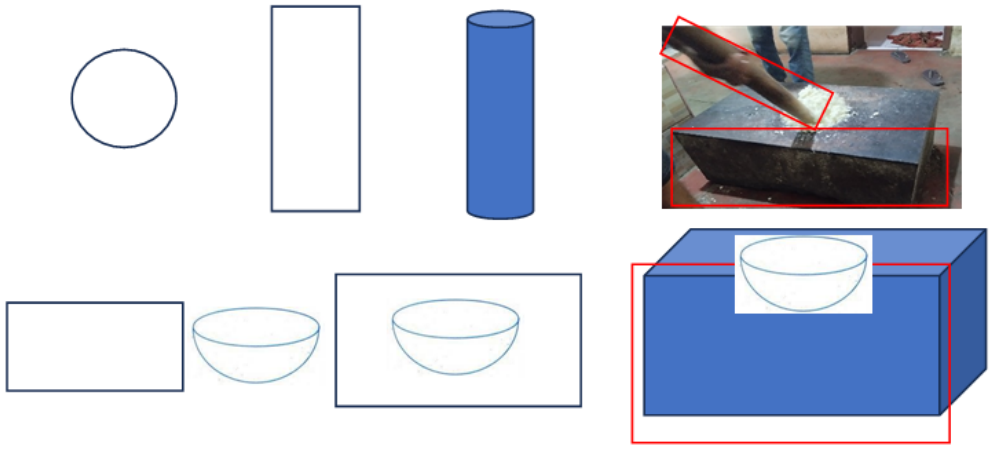

Figure 1. Mathematical Modeling

In everyday life, the concept of a three-dimensional hemisphere is commonly found, one example being the mortar used in making kue balok. The mortar is a traditional tool with a concave, half-spherical shape that is typically used to prepare dough. This half-spherical form has a significant function in the kue balok making process. The hemispherical shape allows the pressure applied to the dough to be distributed more evenly, helping the dough become denser and smoother, thus producing a better texture. In the process of making kue balok, the volume of the hemispherical mortar also plays an important role in determining the amount of dough needed. The volume of a hemisphere can be calculated using the formula:

$$V = \frac{1}{2} \times \frac{4}{3} \pi r^3$$

Where r is the radius of the mortar. Using this formula, the cake maker can estimate the precise amount of dough needed to produce a specific number of cakes.

4.2 Discussion

The validation results demonstrate that the developed media meets the learning feasibility standards, as outlined by Arsyad (2018), who emphasizes that effective learning media should meet content, language, and visual design criteria. The practicality results confirm that both teachers and students found the media user-friendly and engaging, supporting the findings of Alfian et al. (2024) that interactive learning tools enhance students' focus and participation.

Furthermore, the effectiveness results are consistent with previous studies by Aprilla et al. (2020) and Cahyono et al. (2023), which showed that digital comics can improve students' critical thinking and mathematical literacy through contextual and visualized learning. The integration of the Contextual Teaching and Learning (CTL) approach in the digital comic helped students relate mathematical concepts to daily life, making learning more meaningful. As Suasaningdyah (2017) explains, contextual learning enables students to construct knowledge actively based on real-world experiences.

In summary, the contextual-based digital comic developed in this study is valid, practical, and effective for use in mathematics learning. It provides a new alternative for teachers to integrate technology and context-based storytelling into instruction, fostering improved mathematical literacy and learner engagement in the 21st-century classroom

5. Conclusion

Traditional foods such as kue balok not only hold cultural value but also contain significant mathematical elements, particularly in geometric concepts. The process of making kue balok using tools like the mortar and pestle reflects the application of plane and solid geometry. The mortar has a flat surface with a concave center, while the pestle resembles a half-spherical shape. In the kue balok production process, the hemispherical mortar allows even pressure on the dough, resulting in a smoother texture. Furthermore, the formula for calculating the volume of a hemisphere can be used to determine the precise amount of dough required. This demonstrates that mathematical concepts especially geometry can be directly applied in everyday life through local cultural products.

References

Abdulah, A., Ummaroh, A., Salmia, U., Fadlilah, R., & Sari, N. H. M. (2023). Eksplorasi Etnomatematika Pada Kue Tradisional Pekalongan Sebagai Media Belajar Matematika. *Prosiding Seminar Pendidikan Matematika Dan Matematika*, *8*(58), 351–358. https://doi.org/10.21831/pspmm.v8i2.308

Azizah, N., Fitri, D. Y., & Lovia, L. (2023). Pengembangan E-Modul Berbasis Realistic Mathematics Education (RME) Berbantuan Flip Pdf Professional pada Materi Barisan dan. *Jurnal Pendidikan Tambusai*, *7*, 11087–11096.

Fajriyah, E. (2018). Peran etnomatematika terkait konsep matematika dalam mendukung literasi. *PRISMA, Prosiding Seminar Nasional Matematika*, *1*, 114–119. https://journal.unnes.ac.id/sju/index.php/prisma/article/view/19589

Haryanto, Nuham, D., Nusantara, T., Subanji, S., & Rahardjo, S. (2017). Etnomatematika Arfak (Papua Barat-Indonesia): Operasi Bilangan pada Perniagaan Masyarakat Arfak Masa Lalu. *SI MaNIs (Seminar Nasional Integrasi Matematika Dan Nilai*

Islami), *1*(1), 288–292.

Huda, N. T. (2018). Etnomatematika Pada Bentuk Jajanan Pasar di Daerah Istimewa Yogyakarta. *JNPM (Jurnal Nasional Pendidikan Matematika)*, *2*(2), 217. https://doi.org/10.33603/jnpm.v2i2.870

Lail, R. M., & Budiarto, M. T. (2022). Eksplorasi Etnomatematika Budaya Kampung Kemasan Gresik. *MATHEdunesa*, *11*(3), 710–719. https://doi.org/10.26740/mathedunesa.v11n3.p710-719

Masamah, U. (2019). Pengembangan Pembelajaran Matematika Dengan Pendekatan Etnomatematika Berbasis Budaya Lokal Kudus. *Jurnal Pendidikan Matematika (Kudus)*, *1*(2). https://doi.org/10.21043/jpm.v1i2.4882

Permatasari, P., Nuraeniyah, A., Bungsu, D., & Selfiantika, L. (2023). *Improving Mathematical Literacy Based on Ethnomathematical Approach in Congklak Game*. *9*(2), 110–121. https://doi.org/10.15575/ja.v9i2.29766

Purwaning Tyas, A. S. (2017). Identifikasi Kuliner Lokal Indonesia dalam Pembelajaran Bahasa Inggris. *Jurnal Pariwisata Terapan*, *1*(2), 38. https://doi.org/10.22146/jpt.24970

Rosa, M., & Orey, C. (2016). Innovative Approaches in Ethnomathematics. In *Current and Future Perspectives of Ethnomathematics as a Program*. http://www.springer.com/series/14352

Rosa, M., & Orey, D. (2011). Ethnomathematics: the cultural aspects of mathematics. *Revista Latinoamericana de Etnomatemática*, *4*(2), 32–54. http://www.revista.etnomatematica.org/index.php/RLE/article/view/32

Salsabila, S. Z., Agustina, L., & Nurrahmah, A. (2022). Eksplorasi Etnomatematika Pada Makanan Tradisional di Kota Depok (Studi Kasus: Kue Balok khas Jawa Barat). *Jurnal Pendidikan Dan Konseling*, *4*, h.10365.

Setiawan, W., & Listiana, Y. (2021). Eksplorasi Etnomatematika pada Batik Mojokerto. *Jurnal Pendidikan Matematika (JPM)*, *7*(1), 62. https://doi.org/10.33474/jpm.v7i1.4985