Implementation of Ethnomathematics in Jala Jelita Culinary Innovation: A Study of Community Empowerment Based on Local Wisdom in Buntu Bedimbar Village

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Abstract

Ethnomathematics is a mathematics learning approach that integrates local culture with formal mathematical concepts. This community service program aims to provide training on the application of ethnomathematical concepts in Jala Jelita food to the people of Buntu Bedimbar Village, Tanjung Morawa District, Deli Serdang Regency. Jala Jelita is an innovation of Malay food mesh bread that contains various mathematical concepts in the manufacturing process. The implementation method includes initial surveys, program socialization, workshops on the practice of making Jala Jelita, identification of mathematical concepts, and evaluation of training results. The activity was carried out by involving 10 participants consisting of PKK women. The results of the activity showed that participants were able to identify various mathematical concepts in making Jala Jelita, including shape geometry (circle, spiral), measurement concepts (measurements, proportions), number patterns in the frying process, and economic calculations in determining selling prices. This training succeeded in increasing public understanding of the relationship between local culture and mathematics, as well as providing economic added value for MSME actors through education-based marketing innovations. The positive impacts achieved include increasing community mathematical literacy, preserving local culinary culture, and developing ethnomathematics-based creative economy potential.

Keywords: Ethnomathematics, Jala Jelita, Local Culture, Mathematics Learning, Community Empowerment

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Introduction

Ethnomathematics is a concept that connects mathematics with cultural contexts, providing an understanding that mathematics is not only limited to formal formulas in the classroom, but also manifested in various cultural practices of society (D'Ambrosio, 2001). The ethnomathematical approach has been proven to be effective in improving the understanding of mathematical concepts because it links learning to students' daily lives (Abdullah, 2017). In the context of Indonesia, which is rich in cultural diversity, ethnomathematics is an important bridge to preserve local wisdom while improving people's mathematical literacy.

Buntu Bedimbar Village is one of the villages in Tanjung Morawa District, Deli Serdang Regency, which is located on the strategic route to Kualanamu International Airport. This geographical location makes the village have great potential in developing the creative economy sector, especially in the culinary and local product sectors. The village has a rich Malay culture that is reflected in various traditions, including traditional culinary such as roti jala. Roti jala is a typical Malay food that is usually served with curry sauce and has a shape that resembles a net with a unique pattern. However, the people of Buntu Bedimbar Village have not realized that the process of making net bread contains various mathematical concepts such as patterns, geometry, symmetry, proportions, and repetition (Fitri & Siregar, 2019).

The problems faced by the people of Buntu Bedimbar Village are quite complex and interrelated. The lack of public understanding of ethnomathematics and the relationship between mathematics and local culture causes the educational potential of traditional culinary to not be explored properly. The lack of integration of educational values in traditional culinary makes breadcrumbs only seen as ordinary food without realizing the content of mathematical concepts in it. The limitations of creativity in linking local culture with education cause the younger generation to be less interested and lose connection with their cultural heritage. This condition is exacerbated by the lack of culture-based mathematics literacy in the younger generation who are more familiar with mathematics in a formal form at school without seeing real application in daily life. In addition, the lack of innovation in ethnomathematics-based product development makes traditional culinary less competitive in the modern market and loses appeal to young consumers.

Responding to these problems, the service team initiated the idea of "Jala Jelita", which is an innovation of Malay bread with a more varied, beautiful, and aesthetic shape. In addition to adding selling value in terms of appearance, Jala Jelita also has educational potential because its form contains ethnomathematical elements that can be used as a creative learning medium for the community (Rahmawati & Sipayung, 2021). This service activity aims to provide understanding to the community about the concept of ethnomathematics in traditional food, improve the community's skills in processing and developing net bread into Jala Jelita innovations, and develop local culinary potential as a superior product of the village with educational value. Furthermore, this program also aims to encourage the formation of creative culinary businesses based on village communities, preserve Malay cultural heritage through culinary innovations, and increase public awareness of contextual education that links mathematics to daily life.

Literature Review

2.1 Ethnomathematics

Ethnomathematics is the study of mathematical practices in a particular cultural context (Ascher, 1991). This term was first introduced by Ubiratan D'Ambrosio in 1977. Ethnomathematics connects mathematics with culture, showing that each cultural group has a unique way of understanding and applying mathematical concepts in their daily lives.

The ethnomathematics approach in learning has several advantages, including: (1) making mathematics learning more meaningful and contextual, (2) increasing students' motivation to learn, (3) preserving local culture, and (4) developing an appreciation for cultural diversity (Abdullah, 2017).

2.2 Traditional Culinary as a Learning Media

Traditional culinary has great potential as a culture-based learning medium. The traditional food making process often involves various mathematical concepts such as measurements, proportions, patterns, and geometry (Sari & Siregar, 2022). The use of traditional culinary as a learning medium can improve understanding of mathematical concepts while preserving cultural heritage.

2.3 Roti Jala in the Malay Cultural Perspective

Roti jala is one of the traditional Malay foods that has a shape resembling a net (Ministry of Education and Culture, 2020). This food is commonly served in traditional and religious events. The process of making a net bread that involves the creation of a mesh pattern contains mathematical concepts that can be identified and studied.

Research Methodology

3.1 Location and Time

The service activity was carried out in Buntu Bedimbar Village, Tanjung Morawa District, Deli Serdang Regency, North Sumatra Province in June-July 2025. This village is located at geographical coordinates of about 3.525560° North Latitude and 98.838610° East Longitude with an area of about 4.25 km². The selection of this location is based on the strategic location of the village which is on the cross road to Kualanamu International Airport, as well as the potential of Malay culture which is still well preserved, especially in the culinary tradition of roti jala.

3.2 Activity Participants

The participants of the activity amounted to 10 people consisting of PKK (Family Welfare Empowerment) women in Buntu Bedimbar Village. The selection of participants was carried out based on their willingness and interest to develop culinary businesses based on local culture. The participants were chosen because they have a strategic role in community activities and have the potential to be drivers of the creative economy in their environment.

3.3 Stages of Activity

The activity was carried out in three main stages that were systematically designed. The first stage is the preparation stage, which includes location surveys and coordination with village officials to ensure support and readiness of the activity location. At this stage, the preparation of training materials on ethnomathematics was also carried out which was adjusted to the level of community understanding, the preparation of tools and materials for making Jala Jelita, as well as the recruitment of participants carried out in collaboration with the village PKK management.

The second stage is the implementation stage which consists of several core activities. The activity began with the socialization of the program to provide an introduction to ethnomathematical concepts and their relationship with traditional culinary to the participants. Furthermore, a workshop on the identification of mathematical concepts was carried out, where participants were invited to identify the mathematical concepts contained in the making of traditional net bread. The practice of making Jala Jelita is the main activity, where participants get direct training in making Jala Jelita with various variations of patterns and shapes. Participants also receive economic calculation training which includes learning about the calculation of production costs and determining competitive selling prices. The activity was

closed with a product innovation development session that explored various variations of the shape and presentation of Jala Jelita to increase the attractiveness of the product.

The third stage is the evaluation stage which includes the evaluation of the process and training results to measure the success rate of the program, the preparation of activity reports as documentation and accountability, and the dissemination of the results of activities to the wider community and related parties to encourage the replication of the program in other regions.

3.4 Approach Method

This service activity uses a participatory approach, where the community is directly involved starting from the planning, implementation, to evaluation of activities. This approach was chosen so that the program really touches the needs of partners and the results can be felt by the community. The strategies implemented include socialization and education to provide insight into ethnomathematics and its relevance to daily life, participatory training that invites the community directly in the practice of making Jala Jelita with various variations of patterns, continuous mentoring that provides advanced guidance, especially related to creativity, packaging, and simple marketing strategies, as well as product demonstrations that display Jala Jelita's processed products as an example real that can be an inspiration for the community in developing their culinary business.

3.5 Evaluation Methods

Program evaluations are carried out in layers to ensure the success of the program from various aspects. The evaluation of the process was carried out by assessing the involvement of participants during the activity, including their ability to participate in socialization and the practice of making Jala Jelita. The evaluation of the results was carried out by assessing the participants' skills in making Jala Jelita, both in terms of shape, taste, and product packaging. The impact evaluation was carried out to assess the extent to which activities increased public understanding of ethnomathematics, gave rise to new creativity in product development, and opened up culinary business opportunities that can increase family income. As a follow-up, the service team establishes regular communication with partner representatives to monitor the sustainability of activities and provide support if needed.

Results And Discussion

4.1 Results of Activities

The service program has been carried out well and received a positive response from the community. The activity was attended by 10 housewife participants who were enthusiastic in participating in each stage of the training.

1. Understanding Ethnomathematical Concepts

Participants succeeded in understanding ethnomathematical concepts and identified various mathematical concepts in making Jala Jelita, including:

a. Shape Geometry: Circles, spirals, and radial patterns in the arrangement of the Jelita Mesh
b. Symmetry: Swivel symmetry and fold symmetry in flower petal pattern
c. Proportions and Measurements: Measurements of ingredients (flour, eggs, coconut milk) with a specific ratio
d. Number Pattern: Pattern repetition in the frying and drafting process
e. Geometry Transformation: The process of rolling, twisting, and folding the dough

2. Jelita Mesh Making Skills

All participants were able to make Jala Jelita with various variations of shapes. The resulting products have interesting patterns, such as the shape of flowers with colorful petals (green, yellow, orange) that are arranged symmetrically.

3. Understanding Economic Aspects

Participants also learned simple economic calculations, including:

f. Calculation of production cost per unit
g. Competitive selling price determination
h. Culinary product marketing strategy

4.2 Discussion

1. Ethnomathematical Concepts in Jala Jelita

The results of Jala Jelita's innovation show a close relationship with mathematical concepts:

a. Radial Symmetry: The arrangement of mesh coils placed in a circular manner from the center to the edge of the container is a real example of rotary symmetry. This circular pattern indicates that the shape repeats consistently at a certain angle without changing the overall structure.
b. Repeating Pattern (Repetition): Repeated flower petal-shaped mesh rolls of similar sizes and shapes produce visual regularity. This repetition can be attributed to the concept of simple fractals, in which uniform small shapes (petals), when combined, form larger structures (flowers and clusters).
c. Color Proportions and Gradations: The selection and arrangement of green, yellow, and orange colors reflect proportions and gradations. Society intuitively applies the principle of comparison to maintain the balance of the display, for example placing the more dominant green at the edges as a frame, while bright orange and yellow colors are placed in the center.
d. Geometric Transformation: The process of making mesh rolls involves geometric transformations, such as rolling, twisting, and folding the dough to form flower petals. This simple transformation results in a variety of shapes that remain consistent but present a distinct beauty.

2. Impact of Community Empowerment

This activity has several positive impacts:

a. Increasing Mathematics Literacy: People who previously considered mathematics as abstract and difficult, now understand that mathematics can be found in daily activities, especially in traditional cuisine.
b. Preservation of Local Culture: Jala Jelita's innovation helps preserve Malay culinary culture in a way that is more interesting and relevant to the times.
c. Creative Economy Development: Participants began to see business opportunities from Jala Jelita. Several participants expressed their desire to develop this product as a homebased business or MSMEs.
d. Increased Creativity: The training encourages participants to think creatively in developing variations in the form and presentation of Jala Jelita.

3. Challenges and Solutions

Some of the challenges faced during implementation:

a. Limitations of Initial Comprehension: Some participants initially had difficulty understanding ethnomathematical concepts. The solution applied is to use a demonstrative approach and simple language that is easy to understand.
b. Limitations of Production Means: Simple printing equipment limits pattern variation. The service team provides an alternative to manual techniques that can produce interesting patterns without special equipment.

c. Time Constraints: Participants must divide their time between training activities and daily work. The training schedule is adjusted to the participants' free time to ensure optimal participation.

4.3 Compatibility with Learning Outcomes

This program has succeeded in achieving learning outcomes in three aspects:

a. Knowledge Aspect: Participants gain new insights into ethnomathematics and the relationship between culture and science.
b. Skill Aspect: Participants are able to process and produce innovative culinary products that can be developed into creative economy businesses.
c. Attitude Aspect: Activities foster confidence, creativity, and a spirit of preserving local culture.

Conclusion

The service program "Training on the Application of Ethnomathematical Concepts in Jala Jelita Food" has been carried out well and has a positive impact on the people of Buntu Bedimbar Village. Through this activity, the community has succeeded in understanding the relationship between local culture, especially roti jala, and mathematical concepts reflected in the patterns, shapes, and symmetry contained in it. The trainees gained practical skills in processing traditional mesh bread into Jala Jelita which is more innovative, aesthetically pleasing, and has a higher selling value. This activity also succeeded in increasing public awareness about the importance of preserving traditional culture by providing a touch of modern innovation that does not eliminate the essence of local wisdom. More than that, this program has created creative economy opportunities based on local wisdom that has the potential to increase people's income, while strengthening Malay cultural identity in the midst of increasingly modern times.

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