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# Ethnomathematics of Traditional Houses on Two-Dimensional Figure Decomposition Material

**Yuli Bangun Nursanti[1*], Tamara Febriana Salsabiela[2]**

**[1*,2]Mathematics Education Study Program, Universitas Sebelas Maret**
**Jalan Ir. Sutami No. 36A, Surakarta, Jawa Tengah, Indonesia**
[1*]*yulibangununs@staff.uns.ac.id*; [2]*tamarasalsabiela@gmail.com*

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## Abstrak

Penting bagi siswa untuk mengembangkan kemampuan etnomatematika dalam memecahkan masalah kehidupan sehari-hari. Penelitian ini bertujuan untuk mengetahui tingkatan kemampuan siswa dalam etnomatematika konsep dekomposisi bangun datar. Penelitian ini menggunakan metode campuran (mixing methods). Instrumen yang digunakan yaitu lembar kerja peserta didik saat proses pembelajaran materi dekomposisi bangun datar. Subjek penelitian terdiri dari 15 siswa kelas IV B SD Negeri Bakipandeyan 01. Data yang dianalisis menggunakan teknik analisis data kualitatif yaitu mereduksi, memaparkan, dan menyimpulkan. Hasil menunjukan bahwa nilai skor siswa ≥ 80 dengan jumlah siswa sebanyak 15 orang dan persentase 100 % maka dapat disimpulkan tingkat kemampuan siswa dalam etnomatematika konsep dekomposisi bangun datar pada rumah adat Jawa dan menyebutkan sifat-sifat bangun datar tersebut sangat baik dengan kategori A. Dengan demikian, rumah adat Jawa dapat menjadi alternatif dalam sumber belajar Matematika pada materi Dekomposisi Bangun Datar.
Kata Kunci: Dekomposisi Bangun Datar; Etnomatematika; Rumah Adat

## Abstract

It is important for students to develop ethnomathematical abilities in solving daily life problems. This study aims to determine the level of students' ability in ethnomathematics of the concept of two-dimensional figures decomposition. This research uses mixed methods. The instrument used was student worksheets during the learning process of two-dimensional figures decomposition material. The research subjects consisted of 15 students of class IV B SD Negeri Bakipandeyan 01. The data were analyzed using qualitative data analysis techniques, namely reducing, describing, and concluding. The results show that the student score ≥ 80 with a total of 15 students and a percentage of 100%, it can be concluded that the level of students' ability in ethnomathematics the concept of decomposition of two-dimensional figures in Javanese traditional houses and mentioning the properties of these two-dimensional figures is very good with category A. Thus, Javanese traditional houses can be an alternative in learning resources for Mathematics on Two-dimensional figures Decomposition material.
Keywords: Ethnomathematics; Two-dimensional figures Decomposition; Traditional House

## I. INTRODUCTION

Mathematics is studied at all levels of education in Indonesia, starting from elementary school (SD) to college (PT), so it is a continuous subject. One of the lessons that has an important role is mathematics. Mathematics is a discipline that supports the development of science and technology and plays a role in supporting social and cultural sciences.

Education and culture are very important in everyday life because culture is a whole and comprehensive unit that applies in society and education is the basic need of every individual in society. Education and culture cannot be separated but complement each other with various points of interaction (Mathews & S, 2020; Amalia, Wanabuliandari, & Rahayu, 2022). One of the things that can connect culture and education is ethnomathematics.

Ethnomathematics as a branch of science that examines the relationship between culture and mathematics that makes a valuable contribution to contextual understanding in mathematics learning (Nurniyati et al., 2024). Ethnomathematics is a form of mathematics that is culturally based. Ethnomathematics is a mathematics study discipline that describes an analysis of cultural expressions, in the form of ideas, activities, and cultural objects, which have become the characteristics of a particular community (Dari & Jatmiko, 2024).

The main factor in the importance of culture-based learning is using an ethnomathematics approach because of students' difficulties in connecting mathematics with real life (Rewatus et al., 2020). Ethnomathematics will be able to assist students in learning, analyzing, and practicing learning activities, especially on two-dimensional figures material with the use of culturally relevant problem solving work as teaching materials and alternatives in learning (Cahyadi et al., 2020). Cultural values are the basis of character, which is important to be instilled in every individual (Sulfayanti et al., 2022).

The importance of this research is due to the involvement of culture in mathematics learning in schools with the aim that students can become a generation with character and be able to maintain and preserve culture as the foundation of national character (Putra & Prasetyo, 2022). In addition, ethnomathematics plays an important role as a means of strengthening local culture through an independent learning curriculum (Siregar et al., 2024).

In the two-dimensional figures chapter, there is material on two-dimensional figures decomposition which can be connected to learning using ethnomathematics activities. Flat shape decomposition is the process of breaking down a flat shape into two or more simpler flat shapes. Decomposition can be done by giving students pictures of traditional houses and students can understand and decompose the Javanese traditional house into several flat shapes and determine the properties of these flat shapes.

Some of the previous research results show that the ethnomathematics approach can improve ethnomathematics skills in understanding mathematical concepts. The integration of cultural elements can provide a real context for students in bridging the gap between abstract

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understanding of mathematics in everyday life. Therefore, this ethnomathematics approach needs to carefully consider the local context to have a significant positive impact.

Various research results regarding ethnomathematics are applied in the classroom through the use of cultural resources and tools in the form of crafts, arts, folklore, values, morals, ethics, and philosophies that are deeply rooted in belief systems such as research conducted by Karina et al. (2021) and Reginalis (2021), namely ethnomathematics using traditional Indonesian games. The novelty of this research is ethnomathematics using traditional Javanese traditional houses for two-dimensional figures decomposition material.

Based on this background, the author formulates the problem of how students' abilities in ethnomathematics concept decompose Javanese traditional houses into several flat shapes and mention the properties of these flat shapes?

Based on the formulation of the problem, the research objective is to find out the students' ability to decompose a Javanese traditional house into several flat shapes and mention the properties of flat shapes well.

## II. METHOD

This research was conducted in April 2024. The research method used is mixed methods. The use of mixing methods is a research method that uses qualitative research results for quantitative research or vice versa. In this study, the results of qualitative research were used to conduct quantitative research. The research subjects used were students of class IV B of Bakipandeyan 01 State Elementary School with a total of 15 students. The data were analyzed using qualitative data analysis techniques, namely reducing, describing, and concluding.

Learning outcome data were analyzed using Benchmark Assessment (PAP) to determine the level of students' ability in ethnomathematics of the concept of decomposition of two-dimensional figures in Javanese traditional houses and mention the properties of these two-dimensional figures. The conversion criteria with a scale of 5 are as follows in Table 1 (Nada et al., 2023).

Table 1.
Category Conversion Criteria with Scale 5

| Mastery Level | Standard Score |
|---|---|
| $90 - 100\%$ | A |
| $80 - 89\%$ | B |
| $70 - 79\%$ | C |
| $60 - 69\%$ | D |
| $< 59\%$ | E |

Description:
X = student score
A = very good
B = good
C = good enough
D = less good
E = not good

Since the maximum score is set based on the answer key = 100, 90% mastery = 0.9 x 100 = 90. 80% mastery = 0.8 x 100 = 80. 70% mastery = 0.7 x 100 = 70. Mastery of 60% = 0.6 x 100 = 60. Thus, the following conversion Table 2 is obtained:

Table 2.
Conversion Results with Scale 5

| Mastery Level | Standard Score |
|---|---|
| $90 - 100$ | A |
| $80 - 89$ | B |

| Mastery Level | Standard Score |
|---|---|
| $70 - 79$ | C |
| $60 - 69$ | D |
| $< 59$ | E |

Furthermore, the data collection method used is the Two-dimensional figures Decomposition LKPD test, documentation, and literature review. Data in the form of pictures and tables of LKPD instruments for Two-dimensional figures Decomposition and student assessment categories are used to analyze the level of students' understanding ability in ethnomathematics of the concept of two-dimensional figures decomposition in traditional houses and mention the properties of two-dimensional figures.

## III. Result and Discussion

The research activities carried out are reviewing two-dimensional figures decomposition material using the implementation of Javanese traditional house animation ethnomathematics. The activity is carried out by creating a learning discussion group of students to work on the LKPD for Two-dimensional figures Decomposition.

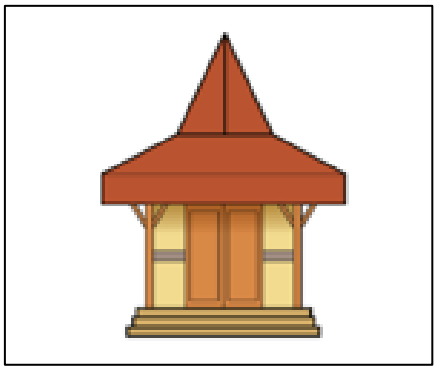
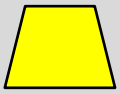
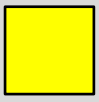


Figure 1. Ethnomathematics of Javanese Traditional Houses

Based on Figure 1, the LKPD Decomposition of Two-dimensional figures that has been carried out, the results of the learning discussion are in the Table 3 as follows.

Table 3.
Pictures, Names, and Properties of Flat Shapes

| Two-dimensional figures Picture | Its properties |
|---|---|
|  Figure 1. Triangle | A triangle is a flat shape that has three sides and three angles.<br>a. Isosceles Triangle<br>Has one-fold symmetry axis, has two opposite sides of equal length, and has one rotary symmetry axis.<br>b. Right Triangle<br>Has one hypotenuse,<br>Does not have a fold axis of symmetry, has two sides perpendicular to each other, does not have a rotary axis of symmetry, one of its angles is a right angle of 90 degrees, and uses the phytagorean formula in finding the length of the hypotenuse. |
|  Figure 2. Trapezoid | Having a pair of parallel sides, having two pairs of equal angles (isosceles trapezoid) or having two right angles (right-angled trapezoid), the sum of the adjacent angles between two parallel lines is 180 degrees (Unaenah et al., 2020) |
|  Figure 3. Rectangle | It has four sides and four corner points, has two pairs of parallel sides facing the same length, all four angles are equal to 90 degrees (right angles), and has two folding symmetries (Nurhalimah et al., 2020). |
|  Figure 4. Square | It has four equal sides, the opposite sides are parallel, and it has four right angles. (Monalisa et al., 2022) |

Based on the results of the research from LKPD, students have been able to identify flat shapes in the concept of decomposition of flat shapes in Javanese traditional houses and mention the properties of these flat shapes. The Javanese traditional house has many

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geometric elements including (1) The shape of the roof of the house is trapezoidal and triangular, (2) The supporting poles in the traditional house are trapezoidal and rectangular, (3) The walls of the house have square and rectangular elements, and (4) The door of the house is rectangular, (5) The stairs of the house are rectangular. In addition, it is known that the student score is 100 with a total of 15 students and a percentage of 100% of all students. The results of the analysis of student scores are as follows.

Table 3.
Student Score Analysis

| Mastery Level | Standard Score | Number of Student | Percentage |
|---|---|---|---|
| $90 - 100$ | A | 15 | 100 % |
| $80 - 89$ | B | 0 | 0 |
| $70 - 79$ | C | 0 | 0 |
| $60 - 69$ | D | 0 | 0 |
| $< 59$ | E | 0 | 0 |

This shows that the Learning Outcomes on two-dimensional figures decomposition material have been understood by all students. Thus, these findings are supported by other studies which state that using ethnomathematics-based LKPD can produce a percentage of learning implementation, student activity, and positive student responses with a very good category (Talo et al., 2024).

Another supporting research states that through ethnomathematics-based learning, students will be more interested in learning (Hartanti, 2021). In addition, other studies state that the results of ethnomathematics-based mathematics learning are very effective in students' mathematical understanding (Sarwoedadi et al., in Soebagyo et al., 2021). Other research states that ethnomathematics helps students in understanding mathematics in their own social and cultural context (Setiani et al., 2023). Ethnomathematics can connect mathematics with culture, change the negative stigma about mathematics, make students more enthusiastic about learning mathematics and can train educators to be creative and innovative in delivering mathematics material with a culture (Wahyuni & Hasanudin, 2023). This is in accordance with research conducted by Luthvia Rohmaini which states that the results of her research show that the learning module with ethnomathematics developed has feasible and interesting criteria for use as a learning resource for mathematics learning. These studies are one proof of the application of ethnomathematics in mathematics learning that teachers can do in innovating learning and improving the quality of mathematics learning.

## IV. CONCLUSION

Ethnomathematics-based learning with animations of Javanese traditional houses carried out in class IV B SD Negeri Bakipandeyan 01 aims to teach mathematics that is associated with culture. Students discuss working on LKPD on Two-dimensional figures Decomposition material. From the ethnomathematics LKPD activity, it is obtained that students can understand the concept of two-dimensional figures decomposition in Javanese traditional houses, identify two-dimensional figures in Javanese traditional house animations which include triangles,

trapezoids, rectangles, and squares and mention the properties of two-dimensional figures. Through this ethnomathematics-based learning, students can understand flat shapes, besides that students also learn to recognize the culture of Javanese traditional houses. Quantitative analysis of the ethnomathematics of the decomposition of Javanese traditional houses with Benchmark Assessment (PAP) on mathematics learning outcomes shows that student learning outcomes on LKPD Two-dimensional figures Decomposition show that the level of student ability in ethnomathematics of the concept of decomposition of two-dimensional figures in Javanese traditional houses and mentioning the properties of these two-dimensional figures is very good with category A. In general, it is concluded that this Javanese traditional house can be an alternative source of learning mathematics on the material of Decomposition of Two-dimensional figures.

Based on the research that has been carried out, the researcher suggests that teachers can use the ethnomathematics approach in learning mathematics. Students should practice their knowledge by doing more practice problems related to ethnomathematics. Other researchers are advised to conduct further research to examine ethnomathematics in populations or samples that are different from this study.

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## AUTHOR'S BIOGRAPHY

**Dr. Yuli Bangun Nursanti, M.Pd.**

She is currently working as a permanent lecturer in the Mathematics Education Study Program, Faculty of Teacher Training and Education, Sebelas Maret University.

**Tamara Febriana Salsabiela**

She is currently a student at the Mathematics Education Study Program, Faculty of Teacher Training and Education, Sebelas Maret University.