

THE ETHNOMATHEMATICS OF BATIK PACE IN GEOMETRY TRANSFORMATION SUBJECT

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Abstract: The objective of the research is to examine the ethnomathematics of *Batik Pace* as the local culture of Pacitan. Kupu Tarung motive of *Batik Pace* is the hand-drawn *batik tulis* with natural dyes. A masterpiece contained the mathematical concept of geometric transformation. The research method used is qualitative by using an ethnographic approach. Data collection techniques used literature studies, documentation, and interviews. The data analysis technique used by Miles & Huberman. The findings of this research are in a piece of Kupu Tarung motive of *Batik Pace* contained the concepts of Reflection, Translation, Rotation, and Dilation.

Keywords: Ethnomathematics, *Batik Pace*, Geometry Transformation

INTRODUCTION

Mathematics is a science that is close to daily life. Although most people do not realize it, the person's activities are related to mathematical concepts. As Arwanto (2017) and Ubayanti (2026) stated that mathematics has been used by people in their daily life. So, it is necessary deeply understood the students in the school that mathematics is not only abstract and theoretical but also contextual in its application (Zayadi, 2017). Contextually, we can relate it to the surrounding environment, for example, introduce the existing culture in our environment. It can be used as a bridge between mathematics and real life based on local culture.

The development of Mathematical concepts in the society which related to local culture, then combined with the development of mathematical concepts in formal education is such a good thing. Besides, the students can understand the material presented, it also provides broad insight to students about local culture. It is because the students come into direct contact.

According to Masamah (2018) viewed from the scientific, mathematics is the human culture result which is the result of activities, making patterns, designing, calculating, and applying to solve problems in real life. So, this research tried to integrate the geometry transformation material with the local culture, that is *Batik Pace*. It is a follow-up to the previous research that raised the basic concepts of geometry in *Batik Pace* (Meifiani, 2021). *Batik Pace* is a typical *Batik* in Pacitan. In this research, the researcher focuses on the Kupu Tarung motive of *Batik Pace*.

KAJIAN LITERATURE

a. Ethnomathematics

Ethnomathematics is defined as one of the sciences in mathematics that examines culture, tribe, religion, ethnicity, and also human activities (Rosa et al., 2016; Rosa & Orey, 2011). Laurens (2016) stated that the effort to introduce mathematics into social life is called an Ethnomathematical model. Meanwhile, D'Ambrosio (2001) explained that learning mathematics by applying culture is represented as ethnomathematics. Thus, ethnomathematics can be used in learning mathematics in schools with a cultural approach, so the mathematics can be understood by students (Irfan, 2016).

b. Geometry Transformation Concept

According to Soedjadi (1999), the concept is an abstract idea used in classifying a set of objects. Meanwhile, Carrol in Trianto (2011) said that the concept is an abstraction of experiences which is defined as a group of events. Where the ability to visualize geometric shapes is a person's spatial intelligence (Dinata, 2019). The types of geometric transformations include: translation (displacement), reflection (mirror), rotation (rotation) and dilation (magnification) Albab, et all (2014).

RESEARCH METHOD

The research method used in this research is descriptive qualitative by using an ethnographic approach. According to Creswell (2012), Ethnography is a qualitative research strategy that aims to describe, analyze, and interpret elements of certain cultural groups such as patterns of behavior, beliefs, and language that develop in society time after time.

FINDINGS AND DISCUSSION

A typical batik from Pacitan, Batik Pace has many features. Batik Pace motives have taken the theme of flora and fauna in Pacitan. During this time, the researcher examined it through ethnomathematics. This research material is a *batik tulis* with the theme of Kupu Tarung motive which used full natural dyes, a product of Batik Craftsmen in Pacitan, that is Batik Saji. An art masterpiece contained learning mathematics. The batik motives are produced through a transformation process: Reflection, Translation, Rotation, and Dilation.

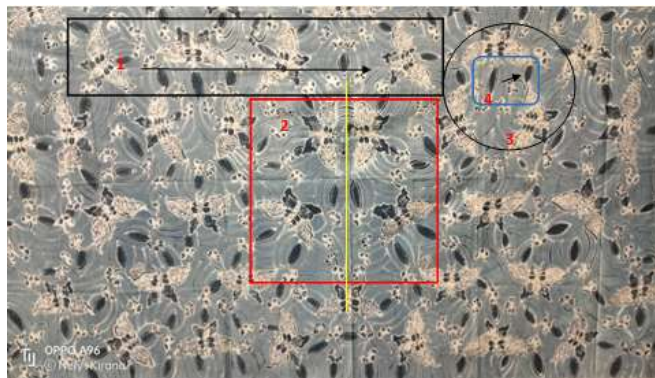


Figure 1. Kupu Tarung motive of Batik Pace.

From the figure above, it can be described that Kupu Tarung motive for Batik Pace contained geometry transformation concepts: Translation for code 1, Reflection for code 2, and Rotation for code 4.

a. Translation Application (shift) for Kupu Tarung motive of Batik Pace

One of the concepts used in making patterns in batik pace is the concept of translation. The principle of this pattern is moving or shifting the Kupu Tarung motive in a certain direction.



Figure 2. Reflection Application

b. Reflection Application (mirror) for the Kupu Tarung motive of Batik Pace

The next very visible concept in making patterns at a batik pace is the concept of reflection. Even though the butterfly looks like fighting, included as part of the process of reflection of a butterfly.



Figure 3. Reflection Application

- c. Dilation Application (multiplication) for motive combination on Batik Pace
The dilatation concept is not directly visible to the butterfly, but it is seen in the complementary ornaments of the pace batik motive, that is the batik pace motive combination. The copying motives process into various sizes: becoming larger or smaller without changing the shape, this is called dilation.



Figure 4. Dilation Application

- d. Rotation Application (rotation) for the Kupu Tarung motive of Batik Pace
Furthermore, the rotation process is also clearly seen in the batik pace pattern making, which is a butterfly that looks like it is rotated according to its axis. With a rotation of more than 180 degrees (a to b)

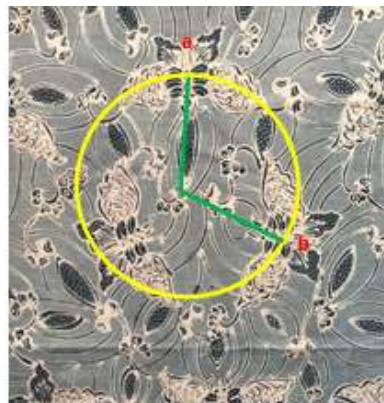


Figure 5. Rotation Application

Based on the explanation described above, it can be inferred that Batik Pace is an art masterpiece that perfectly presents mathematical concepts in Geometry Transformation

material. So, it can be used as material for learning mathematics at school. In the research above, it can be seen that in a piece of fabric Batik Pace can show the characteristic of Translation, Reflection, Dilation, and Rotation. Hopefully, this research can be used as learning material, and also for introducing and increasing our love of the local culture of Pacitan.

CONCLUSION

Ethnomathematics in this research used the concept of geometric transformation where patterns on a Batik Pace can be generated through the process of Translation, Reflection, Dilation, and Rotation. So, the Batik Pace can be used as one of the learning mathematics materials in schools by raising Pacitan local culture elements.

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