




ETHNOMATHEMATICS EXPLORATION OF GEOMETRIC TRANSFORMATION CONCEPTS IN TRADITIONAL CLOTHES OF THE DAYAK KENYAH TRIBE

Abdul Basir Abbas, Universitas Mulawarman, Indonesia
Achmad Muhtadin*, Universitas Mulawarman, Indonesia 
Krismarlina Jalung, Universitas Mulawarman, Indonesia
*e-mail: achmad.muhtadin@fkip.unmul.com (corresponding author)

Abstract: This study aims to explore the traditional clothes of the Dayak Kenyah tribe and is related to the concept of geometric transformation. This type of research is qualitative research with an ethnographic approach. The subject of this research is the traditional clothes and accessories of the Dayak Kenyah tribe, while the object of this study is the geometric transformation concept of the Dayak Kenyah in traditional clothes motifs. Data was collected through observation, interview, and documentation in traditional clothes of the Dayak Kenyah tribe. Based on the exploration results, it was found thirteen traditional clothes and accessories for the Dayak Kenyah traditional clothes (*Bluko, Besunung, Tabit, Kelempit, Baheng, Sapai, Ta'a, Tapung, Sabau, Ulang, Seleng, Kirip, and Anting*) which are examples of the application geometric transformation concepts. The results of the research show that the motifs found in the traditional clothing of the Dayak Kenyah tribe can be a concrete example of the concept of geometric transformation. The geometric transformation concepts found include (1) Translation in *Tabit, Kelempit, Ta'a, and Sabau*; (2) Reflections in *Bluko, Tabit, Kelempit, Sapai, Ta'a, Tapung, Sabau, Ulang, Seleng and Anting*; (3) Rotation of the *Tabit*; (4) No dilatation was found in the traditional clothes motifs of the Dayak Kenyah tribe. Apart from that, in *Besunung, Baheng, and Kirip*, there is no concept of geometric transformation. The example represented in the traditional clothes of the Dayak Kenyah tribe can then become an alternative recommendation for learning media so that students can better interpret geometric transformation material contextually.

Keywords: *Exploration ethnomathematics, traditional clothes, Dayak Kenyah tribe, geometry transformation*

How to cite:

Abbas, A. B., Muhtadin, A., & Jalung, K. (2024). Ethnomathematics exploration of geometric transformation concepts in traditional clothes of the Dayak Kenyah tribe. *Ethnomathematics Journal*, 5(2), 141-163. <https://doi.org/10.21831/ej.v5i2.72042>



INTRODUCTION

Culture is the collective understanding of humans as social beings used to make sense of their environment, their experiences, and the reasons behind actions; i.e., it

motivates them to act in a certain way. Culture can also be seen as something related to reasons and thoughts (Nuh & Dardiri, 2016). Indonesia has a variety of ethnic groups rich in cultural traditions. Each region has its own unique culture, consisting of traditional houses that dominate the environment, traditional games, typical food that is usually eaten every day, wedding customs in an area, cloth motifs that are often used for certain events, handicrafts from the area, and so on. Each tribe has many differences, both in terms of language, lifestyles, and traditional arts (Rojuaniah & Amalia, 2019). Each one is spread over a large portion living in the hinterlands, borders to the highlands.

Culture-based learning can be an alternative in supporting mathematics learning in schools. Ethnomathematics is a mathematics learning that uses a cultural approach (Irawan & Kencanawaty, 2017). Through ethnomathematics applied in mathematics learning, teachers can introduce school mathematics that is too formal to be more contextual (Adelia, Karunia, & Lystia, 2020). The process of learning mathematics in achieving a desired goal makes students more active because it is in line with what students encounter in everyday life according to known culture (Prawira & Aripin, 2022). Through ethnomathematics, teachers can observe how students master the process and use mathematical ideas, conceptions, and practices in solving real problems (Ramadhani, *et al.*, 2023). Ethnomathematics can improve students' critical thinking skills while fostering a love of local cultures (Geni, Mastur, & Hidayah, 2017; Rahmawati, Zaenuri, & Hidayah, 2023).

One culture that has not been explored much is that of Pampang Village, whose residents are of the Dayak Kenyah tribe, which is not far from the city of Samarinda. One of the cultures that is still a way of life for the people of Pampang village is related to the traditional clothes with their various distinctive motifs. Traditional Dayak clothes are traditional clothes worn by people from the Dayak Kenyah tribe when holding traditional ceremonies, weddings, and other events. (Sulisthio, Ivan, & Nurdiah, 2013). There are 13 (thirteen) traditional clothes and accessories from the Dayak Kenyah tribe worn by men and women when holding traditional events in Pampang Village. The traditional clothes and accessories include *Bluko*, *Besunung*, *Tabit*, *Baheng*, *Kelempit*, *Sapai*, *Ta'a*, *Tapung*, *Sabau*, *Ulung*, *Kirip*, *Seleng*, and *Anting*. These various types of traditional clothes and accessories from the Dayak Kenyah tribe can represent concrete ethnomathematical objects.

Based on the results of the observations conducted, it is known that, in the traditional clothes motifs typical of the Dayak Kenyah tribe, there is a potential for mathematics-based culture. In the making of motif images, there is the concept of

geometric transformation to decorate parts of traditional clothes and accessories, including translation, rotation, reflection, and dilatation. The *Sapai* is Bead clothes that have motifs according to social strata of the Dayak Kenyah tribe in Pampang Village. In the *Sapai* motif element, as shown in Figure 1, by abstracting on a line axis parallel to the y axis, the concept of reflection can be found because it is visible from the line axis: the object motif and shadow are in the form of the same face-to-face shape. The process of composing the elements of clothes motifs can be traced more deeply by relating them to the concept of geometric transformation and examine the relationship between its implementation in mathematics learning.



Figure 1. The concept of reflection on *Sapai*

Other research related to ethnomathematics includes the exploration of Geometry content on *Sarung* Samarinda by Pajrin, Haeruddin, & Sugeng (2022) which was obtained through learning based on local wisdom which was linked to research data at the Samarinda Woven *Sarung* site. From this, good mathematical concepts were found that could be seen either directly or it requires abstraction first to make it easier to find the concept of geometric transformation, one of which is the concept of translation. From the research study conducted by Pertiwi & Budiarto (2020), which explored the mathematical concepts contained in Mlaten pottery, one of the finding was the concept of geometric transformation in the typical Majapahit carved pottery. Apart from that, research by Yuningsih, Nursupriana, & Manfaat (2021) shows the geometric concepts contained in the design of the *Lengkong* traditional houses, namely: the concepts of flat shapes (triangles, squares, rectangles, trapezoids, and rhombuses), the concept of flat-sided shapes (beams), the concepts of lines (horizontal, vertical, and perpendicular), the concept of angles (acute angles), and the concepts of geometric transformations (dilatation and reflection).

Existing research related to ethnomathematics is a continuation of previous studies namely the exploration of geometric transformation content on Dayak Kenyah beads by (Haeruddin, Muhtadin, & Yahya, 2023) and (Yahya, *et al.*, 2023). It has been found that,

on Dayak tribe beads, there are geometric transformation concepts which include translation (shift), reflection (mirror), and rotation, and dilatation (multiplication). The research team saw the ethnomathematics potential of the Dayak Kenyah tribal culture, which is characteristic of East Kalimantan, which contains mathematical learning values, especially in traditional clothes and accessories.

This present study is, therefore, aimed at examining the relationship between mathematics learning and cultural elements of the Dayak Kenyah tribe, one of which is exploring the concept of Geometry Transformation in ethnomathematics, namely the relationship between traditional clothes motifs in mathematics learning. The difference from previous research is that the traditional clothes of the Dayak Kenyah tribe in Pampang Village includes motifs on *Bluko*, *Besunung*, *Tabit*, *Baheng*, *Kelempit*, *Sapai*, *Ta'a*, *Tapung*, *Sabau*, *Ulung*, *Kirip*, *Seleng*, and *Anting*, and these are linked with the concepts of geometric transformation related to translation (shift), reflection (mirror), rotation, and Dilatation (multiplication). It is hoped that the results of the exploration of the concept of geometric transformation in the traditional clothes of the Dayak Kenyah tribe will contribute to teachers' wider provisions in teaching mathematics to students; namely, providing contextual meaning from abstract mathematical concepts that have been practiced and developed in society. Apart from that, this study can be a reference for further research in developing ethnomathematics curriculum models and learning media that integrate mathematical concepts and practices based on students' local cultural wisdom especially the traditional clothes of the Dayak Kenyah tribe.

METHOD

This study was carried out in Pampang Village, North Samarinda District, Samarinda City. The study is qualitative research with an ethnographic approach. According to [Sugiyono \(2018\)](#), in qualitative research methods, the researcher is the main instrument, and data collection techniques and analysis place more emphasis on meaning. The data collection technique used was literature study, observation, interviews, and documentation. The subjects of the study were people who worked in the traditional clothing gallery of the Dayak Kenyah tribe. To check the validity of the data, source triangulation techniques were used, starting from data sources obtained directly through interviews, observations and documentation or obtained indirectly through the literature study. The research proceeding can be seen in [Figure 2](#).

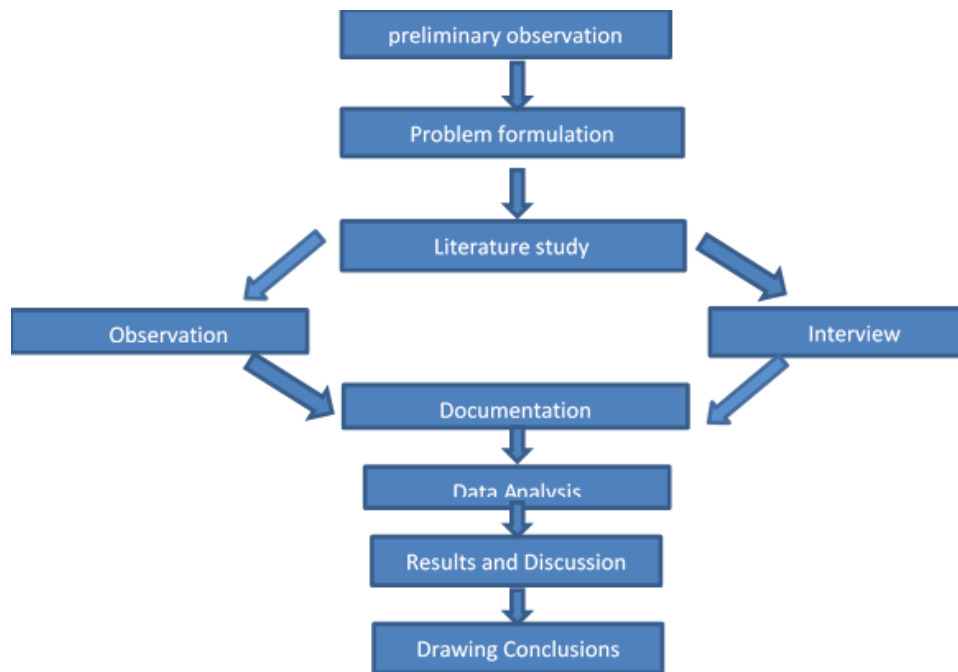


Figure 2. Flow chart of the research proceeding

RESULTS AND DISCUSSION

The data were obtained when conducting the interviews, namely from 3 sources, and documentation found at the production site of the Dayak Kenyah traditional clothes. The traditional clothes of the Dayak Kenyah tribe used as data in this study include the *Bluko*, *Besunung*, *Tabit*, *Baheng*, *Kelempit*, *Sapai*, *Ta'a*, *Tapung*, *Sabau*, *Ulung*, *Kirip*, *Seleng*, and *Anting* which are associated with the concept of geometric transformations, as shown in [Table 1](#).

Table 1. The Results of Geometry Transformation Linkage Analyses on the Dayak Kenyah Traditional Clothes

| Traditional clothes of the Dayak Kenyah tribe | Geometry Transformation | | | |
|---|--------------------------|--------------------------|--------------------------|------------|
| | Translation | Reflection | Rotation | Dilatation |
| <i>Bluko</i> | - | <input type="checkbox"/> | - | - |
| <i>Besunung</i> | - | - | - | - |
| <i>Tabit</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | - |
| <i>Baheng</i> | - | - | - | - |
| <i>Kelempit</i> | <input type="checkbox"/> | <input type="checkbox"/> | - | - |
| <i>Sapai</i> | - | <input type="checkbox"/> | - | - |
| <i>Ta'a</i> | <input type="checkbox"/> | <input type="checkbox"/> | - | - |
| <i>Tapung</i> | - | <input type="checkbox"/> | - | - |
| <i>Sabau</i> | <input type="checkbox"/> | <input type="checkbox"/> | - | - |
| <i>Ulung</i> | - | <input type="checkbox"/> | - | - |
| <i>Kirip</i> | - | - | - | - |
| <i>Seleng</i> | - | <input type="checkbox"/> | - | - |
| <i>Anting</i> | - | <input type="checkbox"/> | - | - |

Table 1 shows that the concept of geometric transformation can be associated with the traditional clothes of the Dayak Kenyah tribe. It can be seen directly with the eye or with the help of the abstraction to find the concepts of flat geometric transformation and space. The following discusses the concept of transformation through the motifs of the Dayak Kenyah traditional clothes.

1. *Bluko*

The *bluko* is the traditional protective hat of the Kenyah tribe. It is made of strong, impact-resistant rattan, and decorated with a tiger and tiger fangs, topped with beads and goat hair in white and red. Through the *Bluko* motif to the geometric transformation concept of reflection can be perceived.

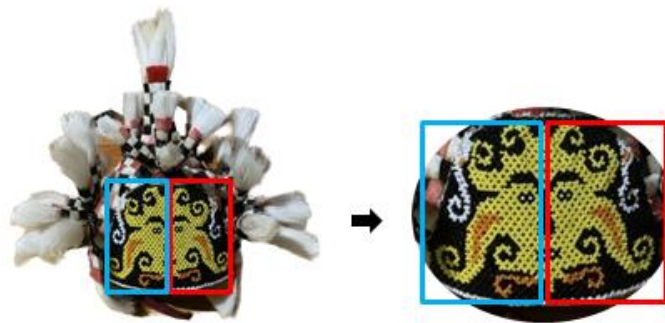


Figure 3. Reflection concept on the *Bluko*

In order to clarify the existence of the concept of reflection on the *Bluko* (Figure 3), it is necessary to make the following sketch (Figure 4).

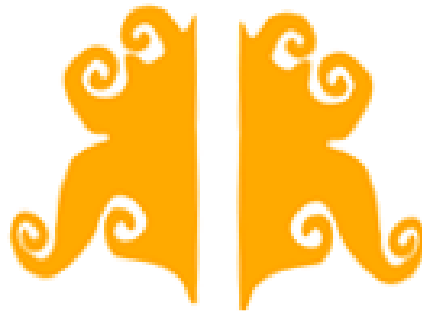


Figure 4. Illustration of the reflection concept on the *Bluko*

2. *Tabit*

The Dayak tribe knows two types of the *Tabit* clothing, namely king baba *tabit* for men and king bibinge *Tabit* for women. These two traditional clothes are made by processing wood bark to make it soft until it resembles cloth with decorative human-like motifs on the outside. Through the *Tabit* motif to the geometric concept of transformation, namely translation, reflection, and rotation, can be found.

a. Translation



Figure 5. The concept of translation on the *Tabit*

In order to clarify the the concept of translation on the *Tabit* (Figure 5), it is necessary to make the following sketch (Figure 6).



Figure 6. Illustration of the translation concept on the *Tabit*

b. Reflection



Figure 7. The concept of reflection on the *Tabit*

In order to clarify the existence of the concept of reflection on the *Tabit* (Figure 7), it is necessary to make the following sketch (Figure 8).



Figure 8. Illustration of the reflection concept on the *Tabit*

c. Rotation



Figure 9. The concept of rotation illustration on the *Tabit*

In order to clarify the existence of the concept of rotation on the *Tabit* (Figure 9), it is necessary to make the following sketch (Figure 10).



Figure 10. Illustration of the rotation concept on the *Tabit*

3. *Kelempit*

A *Kelempit* is a shield made of light and strong wood and decorated with carvings on the outside. The *Kelempit* was originally used as a deterrent to defend the tribe from enemy attacks. Through the *Kelempit* motif, the geometric concepts of transformation can be perceived, namely translation and reflection.

a. Translation

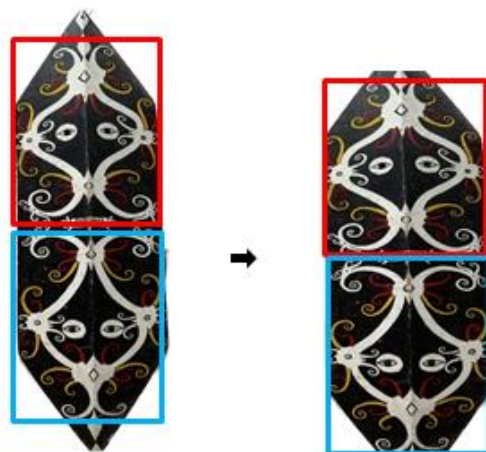


Figure 11. The concept of translation on the *Kelempit*

In order to clarify the existence of the concept of translation on the *Kelempit* (Figure 11), it is necessary to make the following sketch (Figure 12).



Figure 12. Illustration of the concept of translation on the *Kelempit*

b. Reflection

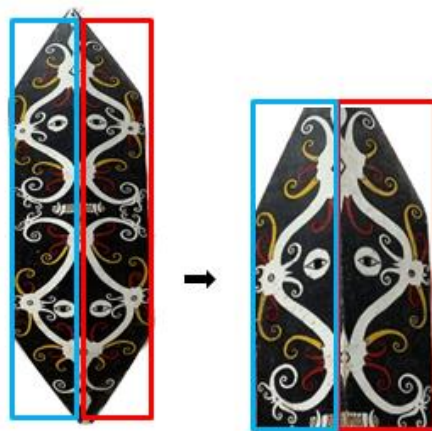


Figure 13. The concept of reflection on the *Kelempit*

In order to clarify the existence of the concept of Reflection on the *Kelempit* (Figure 13), it is necessary to make the following sketch (Figure 14).



Figure 14. Illustration of the concept of reflection on the *Kelempit*

4. *Sapai*

The *sapai* is traditional clothes for men. This traditional clothes model is almost the same as other Dayak traditional clothing, made from black velvet fabric with special patterned bead ornaments. Through the *Sapai* motif, the geometric concept of reflection can be found.

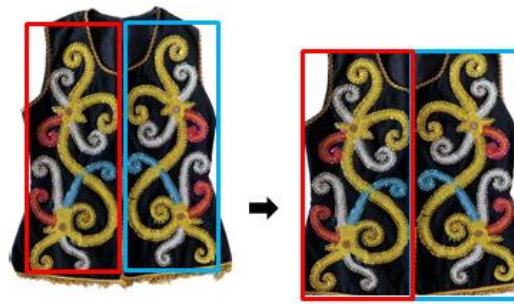


Figure 15. The concept of reflection on the *Sapai*

In order to clarify the existence of the concept of reflection on the *Sapai* (Figure 15), it is necessary to make the following sketch (Figure 16).



Figure 16. Illustration of the reflection concept on the *Sapai*

5. *Ta'a*

The *ta'a* is a term for traditional clothes for women. *Sapai*, beforehand, is traditional clothes for men. This traditional clothes model is almost the same as other Dayak traditional clothes. It is also made of black velvet fabric with special patterned bead ornaments. Through the *Ta'a* motif, the geometric concepts of transformation can be found, namely translation, and reflection.

a. Translation



Figure 17. The concept of translation on the *Ta'a*

In order to clarify the existence of the concept of translation on the *Ta'a* (Figure 17), it is necessary to make the following sketch (Figure 18).



Figure 18. Illustration of the concept of translation on the *Ta'a*

b. Reflection



Figure 19. The concept of reflection on the *Ta'a*

In order to clarify the existence of the concept of Reflection on the *Ta'a* (Figure 19), it is necessary to make the following sketch (Figure 20).



Figure 20. Illustration of the concept of reflection on the *Ta'a*

6. *Tapung*

The *Tapung* is another traditional hat from the Dayak Kenyah tribe decorated with fine beads with black, white, and yellow as the main colors. Through the *Tapung* motif, the geometric concept of transformation, namely reflection, can be perceived.

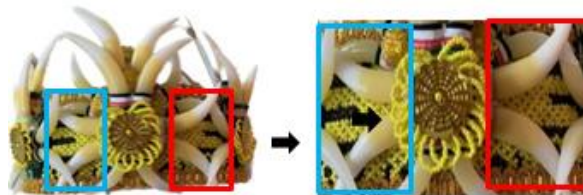


Figure 21. The concept reflection on the *Tapung*

In order to clarify the existence of the concept of reflection on the *Tapung*, (Figure 21), it is necessary to make the following sketch (Figure 22).



Figure 22. Illustration the concept of reflection on the *Tapung*

7. *Sabau*

Sabaus are earrings made of beads that are worn on the ears. In the past, Dayak Kenyah women did not wear beaded earrings, but silver or brass earrings made from brass called *Belakung*. Through the *Sabau* motif, the geometric concept of transformation can be found, namely translation and reflection.

a. Translation

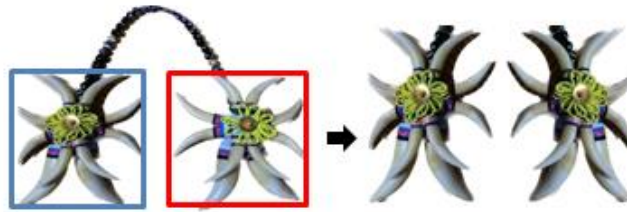


Figure 23. The concept of translation on the *Sabau*

In order to clarify the existence of the concept of translation on the *Sabau* (Figure 23), it is necessary to make the following sketch (Figure 24).



Figure 24. Illustration of the translation concept on the *Sabau*

b. Reflection

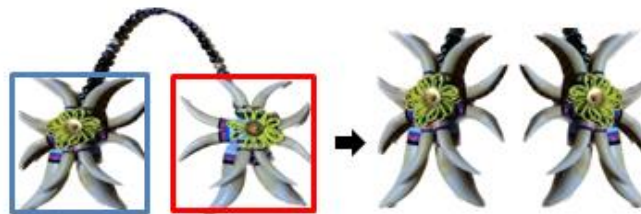


Figure 25. The concept of reflection on the *Sabau*

In order to clarify the existence of the concept of reflection on the *Sabau*, (Figure 25), it is necessary to make the following sketch (Figure 26).



Figure 26. Illustration of the reflection concept on the *Sabau*

8. *U leng*

An *U leng* (necklace) is a necklace made of beautiful colored stone beads that adorns the neck of Dayak Kenyah women. In the *U leng* necklace, the tapung motif shows the transformation concept of reflection.

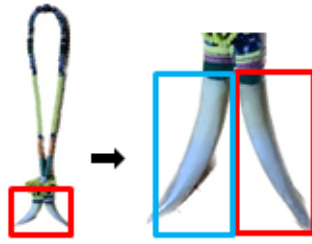


Figure 27. The reflection concept on the *U leng*

In order to clarify the existence of the concept of reflection on the *U leng*, (Figure 27), it is necessary to make the following sketch (Figure 28).



Figure 28. Illustration of the reflection concept on the *U leng*

9. *Seleng*

The *Seleng* is traditional Dayak Kenyah clothes that is used as armbands for the hands or feet. Through the *Seleng* motif, the geometric concept of reflective transformation can be perceived.

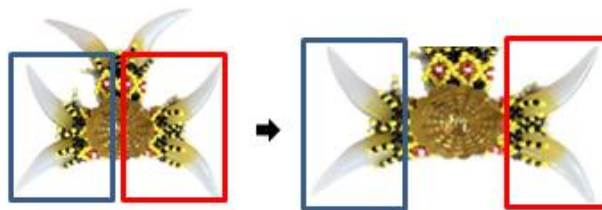


Figure 29. The concept of reflection on the *Seleng*

In order to clarify the existence of the concept of reflection on the *Seleng*, (Figure 29), it is necessary to make the following sketch (Figure 30).



Figure 30. Illustration of the concept of reflection on the *Seleng*

10. *Anting*

There are two types of the *Antings*, namely the *Hisang Semhaa* which is placed around the earlobe, and the *Hisang Kavaat* which is placed on the earlobe. Through the *Anting* motif, the geometric transformation concept of reflection can be perceived.

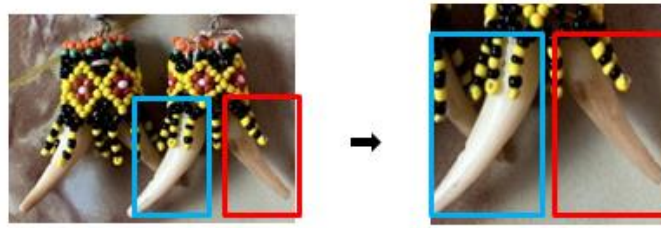


Figure 31. The concept of reflection on the *Anting*

In order to clarify the existence of the concept of reflection on the *Anting* (Figure 31), it is necessary to make the following sketch (Figure 32).



Figure 32. Illustration of the reflection concept on the *Anting*

The first geometric transformation concept material contained in the traditional clothes of the Dayak Kenyah tribe in Pampang village is the translation. The translation (shift) is a type of geometric transformation that moves all points on a figure to the same distance (Kurniasih & Handayani, 2017). Translations are found in the motifs of traditional clothes of the Dayak Kenyah tribe in the *Tabit*, *Kelempit*, *Ta'a* and *Sabau*. By abstracting to the Cartesian coordinates and taking a line parallel to the x and y axes, then connecting the parts of the existing character motifs, the concept of translation is formed due to shifts with the same direction and distance. This is shown in Figure 33.

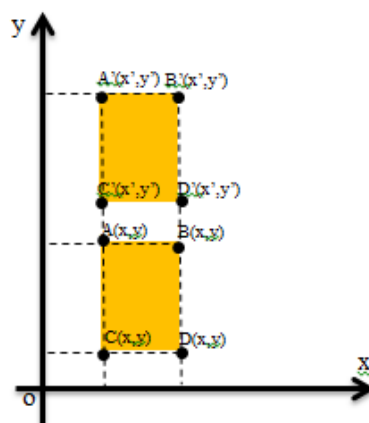


Figure 33. The translation forming process on the *Tabit*

In the same way, by abstracting to the Cartesian coordinates and taking a line parallel to the x and y axes, by linking parts of the existing *Kelempit* motifs, the concept of translation is found due to shifts with the same direction and distance as shown in Figure 34.

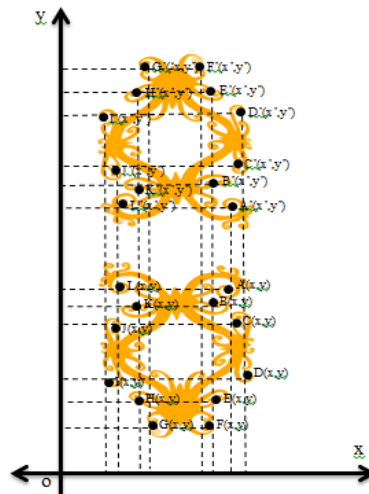


Figure 34. The process of translation forming in the *Kelempit*

Similarly, by abstracting to the Cartesian coordinates and taking a line parallel to the x and y axes, by connecting parts of the existing *Ta'a* motif, the concept of translation is found due to shifts with the same direction and distance as shown in [Figure 35](#).

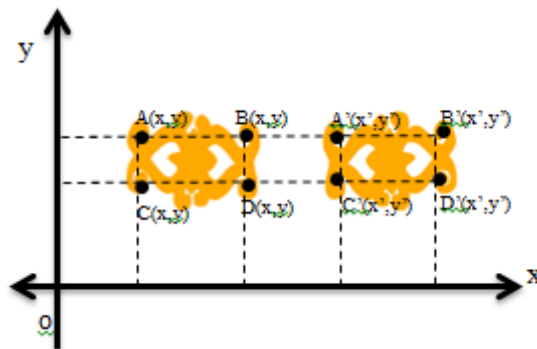


Figure 35. The translation forming process in the *Ta'a*

The same processing is done for the *Sabau*. By abstracting to Cartesian coordinates and taking a line parallel to the x and y axes, by associating parts of the existing *Sabau* motif, the concept of translation is found due to shifts with the same direction and distance as shown in [Figure 36](#).

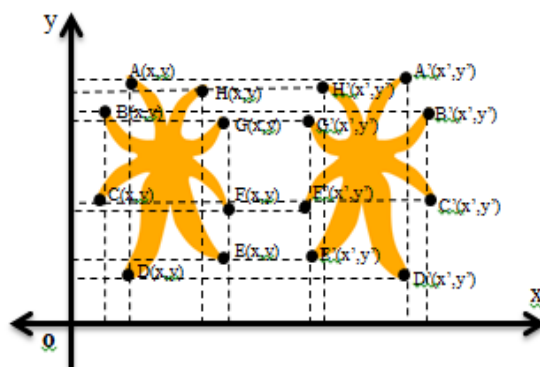


Figure 36. Translation forming process in the *Sabau*

The next geometric transformation concept material contained in the traditional clothes of the Dayak Kenyak tribe in Pampang village is the reflection. The reflection is a type of geometric transformation that moves every point in a plane by using the mirror image properties of the point being moved (Kurniasih & Handayani, 2017). Reflections are found in almost all of the motifs of traditional clothes of the Dayak Kenyah tribe. They were found in the *Bluko*, *Tabit*, *Kelempit*, *Sapai*, *Ta'a*, *Tapung*, *Sabau*, *Ulung*, *Seleng*, and *Anting*. By abstracting to Cartesian coordinates and taking one of the lines parallel to the y-axis, by linking parts of the existing motifs, the concept of reflection is found because it has an axis and a shadow in the form of facing shapes the same as shown in Figure 37.

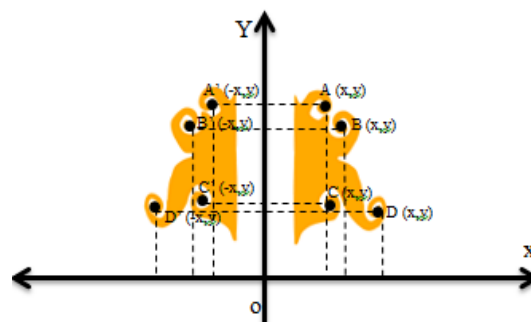


Figure 37. The making process of reflection on the *Bluko*

By abstracting to Cartesian coordinates and taking one of the lines parallel to the y-axis, by associating parts of the existing *Tabit* motifs, the concept of reflection is found because it has an axis and a shadow in the form of the same opposite shape as shown in Figure 38.

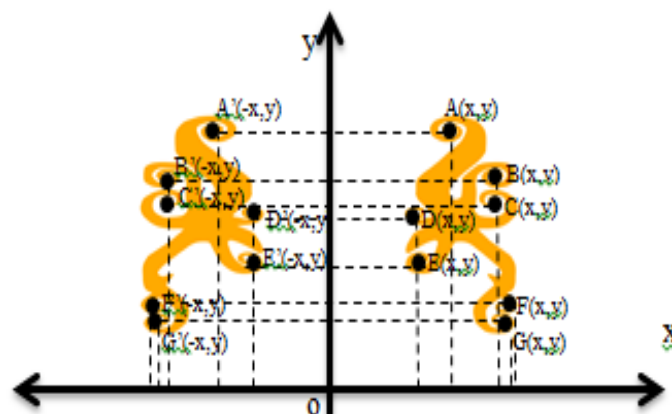


Figure 38. The making process of reflection on the *Tabit*

By abstracting to Cartesian coordinates and taking one of the lines parallel to the y-axis, by associating parts of the existing *Kelempit* motifs, the concept of reflection is found because it has an axes and shadows in the form of opposite shapes similar to those shown in Figure 39.

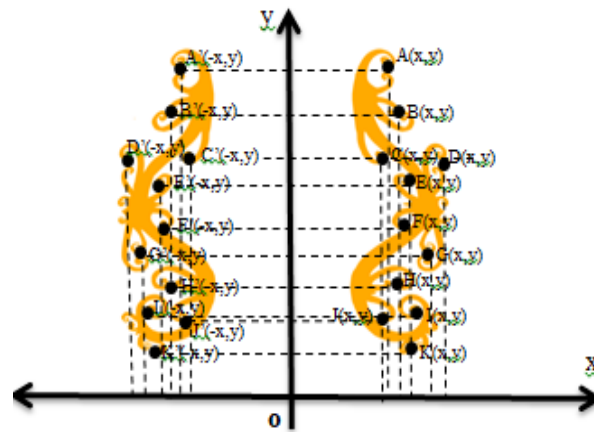


Figure 39. The reflection making process on the *Kelempit*

By abstracting to Cartesian coordinates and taking one of the lines parallel to the y-axis, by associating parts of the existing *Sapai* motif, the concept of reflection is found because it has an axis and an image in the form of the same opposite shape as shown in Figure 40.

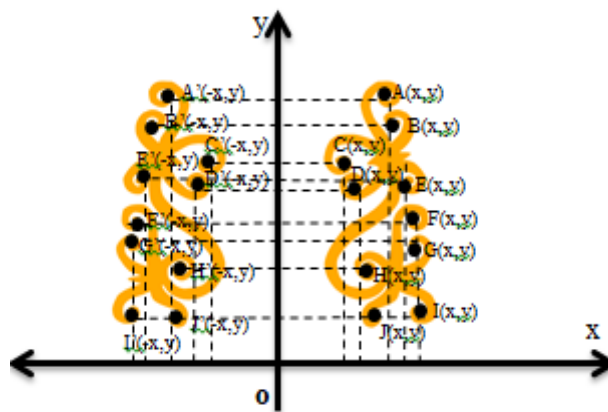


Figure 40. The process of reflection making on the *Sapai*

By abstracting to Cartesian coordinates and taking one of the lines parallel to the y-axis, by associating parts of the existing *Ta'a* motif, the concept of reflection is found because it has an axis and an image in the form of the same opposite shapes as shown in Figure 41.

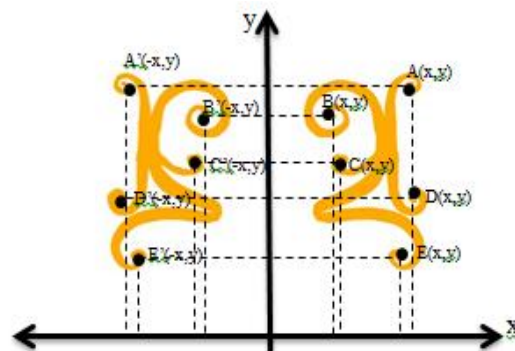


Figure 41. The process of reflection on *Ta'a*

By abstracting to Cartesian coordinates and taking one of the lines parallel to the y-axis, by associating parts of the existing *Tapung* motif, the concept of reflection is found because it has an axis and a shadow in the form of the same opposite shape as shown in Figure 42.

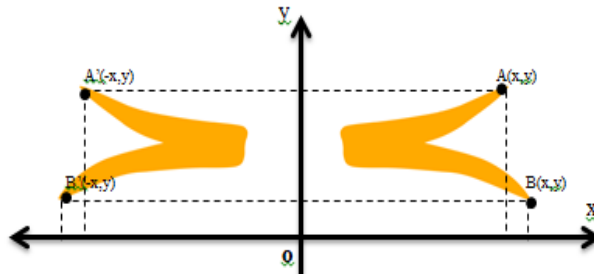


Figure 42. Reflection making process on the *Tapung*

By abstracting to Cartesian coordinates and taking one of the lines parallel to the y-axis, by associating parts of the existing *Sabau* motif, the concept of reflection is found because it has an axis and a shadow in the form of facing the same shapes as shown in Figure 43.

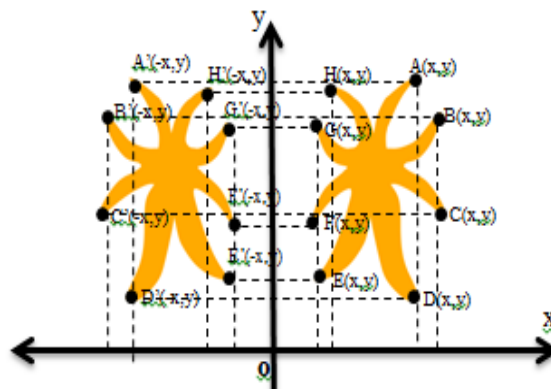


Figure 43. The making process of reflection on the *Sabau*

By abstracting to Cartesian coordinates and taking one of the lines parallel to the y-axis, by associating parts of the existing *Ulung* motifs, the concept of reflection is found because it has an axis and an image in the form of the same opposite shape as shown in Figure 44.

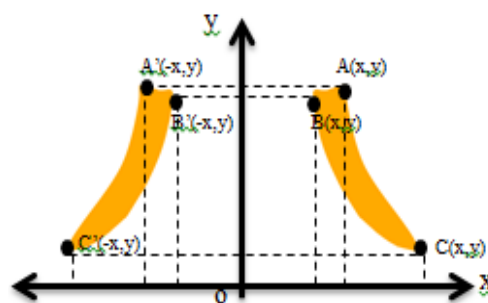


Figure 44. Reflection making process on the *Seleng*

By abstracting to Cartesian coordinates and taking one of the lines parallel to the y-axis, by associating parts of the existing *Seleng* motifs, the concept of reflection is found because it has an axis and an image in the form of the same face shape as shown in Figure 45.

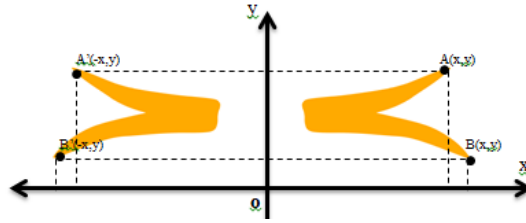


Figure 45. The reflection making process on the *Seleng*

By abstracting to Cartesian coordinates and taking one of the lines parallel to the y-axis, by associating parts of the existing *Anting* motifs, the concept of reflection is found because it has an axis and a shadow in the form of the same opposite shape as shown in Figure 46.

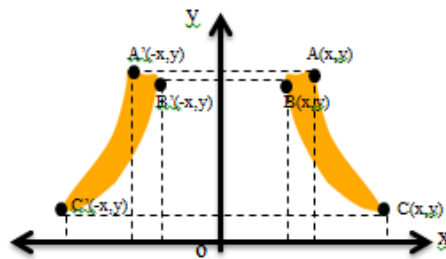


Figure 46. The making process of reflection on the *Anting*

The next geometric transformation concept material contained in the traditional clothes of the Dayak Kenyah tribe in Pampang village is rotation. Rotation is a type of geometric transformation that rotates each point in the image to a certain angle and direction to a fixed point (Kurniasih & Handayani, 2017). Rotation is found in the motifs of traditional clothes of the Dayak Kenyah tribe in the *Tabit*. By removing some of the lines so that only two shapes remain, namely by connecting parts of the existing character motifs and the two abstracted lines as Cartesian coordinates, the scheme of the concept of rotation of the center O with $\alpha = +90^\circ$ is formed as shown in Figure 47.

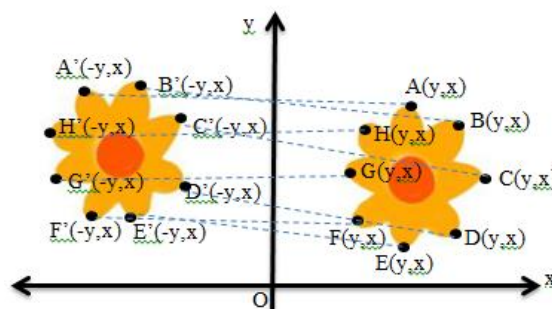


Figure 47. The making process of rotation on *Tabit*

The material for the last geometric transformation concept, but not found in the traditional clothes of the Dayak Kenyah tribe in Pampang village, is dilatation. Dilatation (multiplication) is a type of geometric transformation that can change the size of an image. The dilatation contains the center point and the scale factor. Dilatation to the center point means the multiplication of the coordinates of the points contained in a plane with a scale factor k . If $k > 1$, then there is an enlargement of the image size, but if $0 < k < 1$; then there is a reduction in the size of the image (Kurniasih & Handayani, 2017). Dilatation is not found in the Dayak Kenyah traditional clothes motifs, so it can be concluded from the four types of geometric transformation concepts that the most (dominant) motif that appears is the reflection concept.

The results of study show that the traditional clothes motifs of the Dayak Kenyah tribe of the community in Pampang Village, Samarinda City, East Kalimantan, including the *Bluko*, *Tabit*, *Kelempit*, *Sapai*, *Ta'a*, *Tapung*, *Sabau*, *Ulung*, *Seleng* and *Anting* contain elements of mathematics; that is, the use of the concept of geometric transformation in the motifs is found while, in *Besunung*, *Baheng*, *Kirip* this element is not found. Because they contain the concepts of geometric transformations, these custom clothes can be used in learning mathematics in the classroom as a learning resource, especially in connection with the concept of transformation in the context of everyday life. Culture-based mathematics learning is an implication of cultural characteristics that are in accordance with the demands of the curriculum as well as in accordance with the diverse Indonesian culture (Ratuanik & Kundra, 2018).

The motifs on the traditional clothes of the Dayak Kenyah tribe and their accessories represent the concepts of geometric transformations including translation type, reflection type, and rotation type. The examples presented in traditional Dayak clothes can then be recommended as alternative learning media so that students can more easily understand the geometric transformation material. Learning with a contextual approach is more related to real life which makes students more actively involved in the learning process (Kadir, 2013). In addition, learning mathematics through ethnomathematics objects can make mathematics more applicable and make it easier for students to understand abstract mathematics because it uses concrete ethnomathematics objects (Hardiarti, 2017). One way that can be done so that students' mathematical inspirations increase when receiving geometric transformation material is to provide opportunities for students to associate mathematical material with what they get in everyday life and with more concrete examples (Lydiati, 2020).

CONCLUSION

Based on the results of the ethnomathematics exploration of the Dayak Kenyah traditional clothes, it can be concluded that the Dayak Kenyah traditional clothes contain the concept of geometric transformation in the *Bluko*, *Tabit*, *Kelempit*, *Sapai*, *Ta'a*, *Tapung*, *Sabau*, *Ulung*, *Seleng* and *Anting*. The geometric transformation concepts found include (1) translations on the *Tabit*, *Kelempit*, *Ta'a*, and *Sabau*; (2) reflection on the *Bluko*, *Tabit*, *Kelempit*, *Sapai*, *Ta'a*, *Tapung*, *Sabau*, *Ulung*, *Seleng* and *Anting*; and (3) rotation on the *Tabit*. No dilatation was found in the Dayak Kenyah traditional clothes motifs. In addition, in *Besunung*, *Baheng* and *Kirip*, the concept of geometric transformation is not found. So it can be concluded that, from the four types of geometric transformation concepts, the most (dominant) motif that appears is the reflection concept. Further research should better contribute to the development of mathematics learning tools in schools on geometric transformation material, especially with an ethnomathematics approach in the context of traditional clothes of the Dayak Kenyah tribe.

ACKNOWLEDGEMENTS

Thanks to all those who have helped in the completion of this study. It is hoped that this study will be a useful reference for readers, especially education activists and educators in carrying out the mathematics learning. The researchers suggest further research on the development of mathematics learning tools through the Dayak Kenyah traditional clothes so that they can be applied in mathematics learning. In addition, researchers suggest an exploration of other mathematical concepts in the *Dayak Kenyah* tribe.

REFERENCES

- Adelia, H., Karunia, Y. A., & Lystia, S. N. (2020). Etnomatematika pada tahapan-tahapan kegiatan penanaman dan pemanfaatan jamur tiram serta implementasinya dalam pembelajaran matematika. *ProSANDIKA UNIKAL (Prosiding Seminar Nasional Pendidikan Matematika Universitas Pekalongan)*, 1, 199–208. <https://proceeding.unikal.ac.id/index.php/sandika/article/view/411>
- Geni, P. R. L., Mastur, Z., & Hidayah, I. (2017). Kemampuan pemecahan masalah siswa pada pembelajaran problem based learning bernuansa etnomatematika ditinjau dari gaya kognitif. *Unnes Journal of Mathematics Education Research*, 6(1), 11-17. <https://journal.unnes.ac.id/sju/ujmer/article/view/17232>

- Haeruddin, Muhtadin, A., & Yahya, M. H. N. (2023). Eksplorasi etnomatematika konsep transformasi geometri translasi pada motif kerajinan manik-manik Suku Dayak Kenyah. *Jurnal Ilmiah Pendidikan Matematika Al Qalasadi*, 7(1), 22-29. <https://doi.org/10.32505/qalasadi.v7i1.5587>
- Hardiarti, S. (2017). Etnomatematika: Aplikasi bangun datar segiempat pada Candi Muaro Jambi. *Jurnal Aksioma*, 8(2), 99 – 110. <https://doi.org/10.26877/aks.v8i2.1707>
- Irawan, A., & Kencanawaty, G. (2017). Implementasi pembelajaran matematika realistik berbasis etnomatematika. *Journal of Medives: Journal of Mathematics Education IKIP Veteran Semarang*, 1(2), Art. 2. <https://e-journal.ivet.ac.id/index.php/matematika/article/view/483>
- Kadir, A. (2013). Konsep pembelajaran kontekstual di sekolah. *Dinamika Ilmu*, 13(1). <https://doi.org/10.21093/di.v13i1.20>
- Kurniasih, M. D., & Handayani, I. (2017). Tangkas geometri transformasi. Jakarta: Fakultas Pendidikan dan Ilmu Pendidikan Universitas Muhammadiyah Prof Dr HAMKA. <https://doi.org/10.37058/jp3m.v7i1.2551>
- Lydiati, I. (2020). Peningkatan koneksi matematis pada materi transformasi geometri menggunakan strategi pembelajaran react berbantuan media motif batik kelas XI IPS 1 SMA Negeri 7 Yogyakarta. *Ideguru: Jurnal Karya Ilmiah Guru*, 5(1), 25 – 33. [10.51169/ideguru.v5i1.109](https://doi.org/10.51169/ideguru.v5i1.109)
- Nuh, Z. M., & Dardiri. (2016). Etnomatematika dalam sistem pembilangan pada masyarakat Melayu Riau. *Kutubkhanah: Jurnal Penelitian sosial keagamaan*, 19(2), 220-238. <http://dx.doi.org/10.24014/sb.v14i2.4429>
- Pajrin, N. F., Haeruddin, & Sugeng. (2022). Eksplorasi konsep geometri jenjang SMP pada motif sarung Samarinda. *Jurnal Karya Pendidikan Matematika*, 9(2), 1 -12. <https://doi.org/10.26714/jkpm.9.2.2022.1-12>
- Pertiwi, I. J., & Budiarto, M. T. (2020). Eksplorasi etnomatematika pada Gerabah Mlaten. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, 4(2), Art. 2. <https://doi.org/10.31004/cendekia.v4i2.257>
- Prawira, M. J., & Aripin, F. Y. (2022). Peningkatan kemampuan koneksi matematis siswa dengan model Pendidikan Matematika Realistik Indonesia (PMRI) berbasis Etnomatematika Betawi pada kelas VI di SDN Batu Ampar 01 Pagi Jakarta Timur. *JP3M (Jurnal PGSD, Penjaskesrek, PPKN Dan Matematika)*, 3(02), 148–162. <https://doi.org/10.38048/jipcb.v11i2.3633>
- Rahmawati, L., Zaenuri, Z., & Hidayah, I. (2023). Pembelajaran bernuansa etnomatematika sebagai upaya menumbuhkan karakter cinta budaya dan kemampuan pemecahan masalah matematis. *Journal of Authentic Research on Mathematics Education (JARME)*, 5(1), Art. 1. <https://doi.org/10.37058/jarme.v5i1.5984>
- Ramadhani, A., Mutmainna, S. N., Mirnawati, & Irmayanti. (2023). Peran etnomatematika dalam pembelajaran matematika pada kurikulum 2013. *COMPETITIVE: Journal of Education*, 2(1), Art. 1. <https://doi.org/10.58355/competitive.v2i1.16>

- Ratuanik, M., & Kundre, O. T. (2018). Pemanfaatan etnomatematika kerajinan tangan anyaman masyarakat Maluku Tenggara Barat dalam pembelajaran. In Prosiding Seminar Nasional Pendidikan Matematika Etnomatnesia. <https://jurnal.ustjogja.ac.id/index.php/etnomatnesia/article/view/2356>
- Rojuaniah & Amalia, L. (2019). Penguatan budaya lokal industri kerajinan Menyongsong IKN Kalimantan Timur. Jakarta : Universitas Esa Unggul.
- Sugiyono. (2018). *Metode penelitian kuantitatif, kualitatif dan R&D*. Bandung: Alfabeta.
- Sulisthio, Ivan, & Nurdiah, E. A. (2013). Fasilitas Ecomuseum Suku Dayak Kenyah Desa Pampang di Samarinda. *JURNAL eDIMENSI ARSITEKTUR*, 225-232. <https://media.neliti.com/media/publications/183532-ID-fasilitas-ecomuseum-suku-dayak-kenyah-de.pdf>
- Yahya, M. H. N., Haeruddin, Muhtadin, A., & Rizki, N. A. (2023). The geometry transformation concepts in bead craft motifs by the Kenyah Dayak tribe. *Ethnomathematics Journal*, 4(1), 36 – 52. 10.21831/ej.v4i1.58425
- Yuningsih, N., Nursupriah, I., & Manfaat, B. (2021). Eksplorasi Etnomatematika pada Rancang Bangun Rumah Adat Lengkong. *Jurnal Riset Pendidikan Matematika Jakarta*, 3(1), Art. 1. <https://doi.org/10.21009/jrpmj.v3i1.19517>