Jurnal Pendidikan Matematika
ISSN-p 2086-8235 | ISSN-e 2597-3592
Vol. 16, No. 1, January 2025, Pages: 64-75, Doi: http://dx.doi.org/10.36709/jpm.v16i1.243
Available Online at https://jpm.uho.ac.id/

Exploration of Ethnomathematics in Betawi Batik Motifs for Teaching Plane Geometry

Ririn Widiyasari [1)] *, Kartika Nur Syahbani Wiratno [1)]
[1]Department of Mathematics Education, Universitas Muhammadiyah Jakarta. Jakarta, Indonesia.

Abstract: Batik is one of Indonesia's cultural heritages that must be preserved. Batik has different characteristics and philosophies in each region, one of which is Betawi batik. Betawi batik has various characteristics and philosophies in each motif which, if examined more deeply, are related to flat shapes or mathematical concepts. The relationship between culture and mathematics is also known as ethnomathematics. The purpose of this research is to explore the concept of flat shapes in Betawi batik motifs. The research method used is a qualitative method with an ethnographic approach. This research uses human instruments, namely the researchers themselves, where everything that happens in the field will be recorded by researchers using exploration and observation guidelines, digging and analyzing all documents found and presenting them in the research results. The result of this study is that in Betawi batik motifs there is a concept in the form of flat shapes. The flat shapes found in this type of Betawi batik motif are triangles, squares, rectangles, rhombuses, kites, trapezoids, and circles. The results of this study are related to the process of learning mathematics in schools and can be used as learning materials at the primary and secondary school levels.

Keywords: betawi batik motifs; ethnomathematics; plane geometry.

INTRODUCTION

Indonesia is an archipelago where one island is separated from another by several natural boundaries, such as straits, rivers and mountains. These natural boundaries will directly group various communities with distinctive cultural patterns. Some experts state that Indonesian culture is a culture that contains the overall understanding of social values, social norms, science as well as the overall social, religious structures, all intellectual and artistic statements that characterize a society. Mathematical activities in a group of cultures are applied to various community activities in various tribes, cultures and customs spread throughout the country (Ibrahim & Napfiah, 2023). This culture is a cultural heritage that comes from predecessors so that it must be preserved and maintained by the next generation, especially in today's increasingly developing era. One of the cultural heritages that must be preserved is Batik (Iskandar & Kustiyah, 2017).

On October 2, 2019, batik was designated as Indonesia's intangible cultural heritage by the United Nations Educational, Scientific and Cultural Organization (UNESCO) (Iskandar & Kustiyah, 2017). Batik itself has a variety of beauties contained in batik motifs, making batik a characteristic of various regions and islands in Indonesia, such as one example is batik with Jakarta culture, carrying Betawi batik. In general, Betawi batik can be seen in various aspects, starting from the color, batik which is declared as a traditional style and used in formal events such as Abang None Jakarta uses contrasting and striking colors with a distinctive tumpal head motif (Abdullah & Rahmawati, 2021; Soedarwanto et al., 2017). Betawi batik also has many variants of motifs including triangle, kite, square, free form fireworks and flower motifs. Based on the variety of Betawi batik motifs, it can be seen the shapes of motifs related to mathematics in flat building learning.

According to (Carel, 2021) in learning mathematics, students' problem solving skills are still relatively low. This is reinforced by the opinion (Nurliastuti, 2018) that Indonesia is still far behind compared to other countries due to the low quality of education, especially

* Correspondence to Author. E-mail: ririn.widiyasari@umj.ac.id Publisher: Department Mathematics Education, Universitas Halu Oleo

mathematics. (Mandini, 2018) argues that in Indonesia math learning is usually done by the teacher starting the lesson only introducing definitions and formulas, without connecting examples in everyday life such as culture and art. This mathematics learning if associated with culture will affect individual behavior and has great potential for the development of individual understanding, including mathematics learning (Bishop, 1991). The relationship between culture and mathematics is known as ethnomathematics.

Ethnomathematics itself was founded by D'Ambrosio in 1977. Mathematics and specific groups of people's cultures and ways of life are combined in the science known as ethnomathematics (D'ambrosio, 1985). According to D'Ambrosio's writings, it is understood that ethnomathematics can be useful as an alternative in the implicit philosophy of mathematical practice in schools, as the contextual approach has (Febrianti & Afifi, 2022; Rosa et al., 2016; Rosa & Gavarrete, 2017). Ethnomathematics is also defined as a mathematical construct that is followed by the value system, culture and views of the community (Febrianti & Afifi, 2022; Sulaiman et al., 2019). According (Sirate, 2012) argues that the application of ethnomathematics as a means to motivate, stimulate students, can improve their ability to learn mathematics. This is because ethnomathematics is part of students' daily lives which is an initial conception that has been owned from the local socio-cultural environment.

The study of ethnomathematics has grown significantly over the decades, especially for the academic teaching of mathematics in schools (Febrianti & Afifi, 2022; Lestari et al., 2018). Ethnomathematics is a form of mathematics that is influenced or based on culture (Wahyuni et al., 2013; Widodo et al., 2021). Ethnomathematics can also be used as a learning innovation to learn math easily, thus through the application of ethnomathematics in education, especially mathematics education. The application of ethnomathematics helps students learn mathematics through real activities to understand abstract mathematical concepts (Widada et al., 2019).

Several research studies have been researched on ethnomathematics. Researchers (Sari et al., 2021) conducted research on the Exploration of Ethnomathematics in Madura Batik Art in Geometry Learning using qualitative descriptive research using an ethnographic approach. Ethnography is an empirical and theoretical approach used to describe, explain and analyze cultural elements of a community or ethnic group. This approach focuses on being able to organize the surrounding culture in their minds and being able to apply it to the mathematics learning process. The result of this research is a description of some typical motifs on Madura Batik that contain mathematical values. Some of the motifs on Madura Batik contain several mathematical concepts. These mathematical concepts such as the concept of geometry.

The second study (Abdullah & Rahmawati, 2021) conducted research on the Exploration of Ethnomathematics in Krebet Wood Batik Bantul. In this study, it uses an exploratory type of research, namely exploring Krebet wooden batik in mathematics learning with an ethnographic approach. Ethnography is used to describe, explore, and analyze the cultural elements of a society. The results of this study include the concepts of lines and angles, rectangles and triangles, circles, flat-sided and curved-sided spaces, congruence, and geometric transformations. The results of ethnomathematics exploration can be used in mathematics learning with the Contextual Teaching Learning (CTL) approach, with wooden batik as an initial bridge to mathematical concepts. The process of learning mathematics using this approach will improve critical thinking skills which are very necessary at this time (Abdullah & Rahmawati, 2021; Nisa et al., 2023; Richardo et al., 2023).

The third study (Afifah et al., 2020) conducted research on the Exploration of Ethnomathematics in Batik Gajah Mada Motif Sekar Jagad Tulungagung. This research is a qualitative research with an ethnographic approach. The ethnographic approach is used to obtain a description of the culture contained in the Tulungagung Batik Gajah Mada Sekar

Jagad motif, while qualitative is used to describe and analyze the information as a whole. The results of the study can be concluded that in Batik Gajah Mada motif Sekar Jagad Tulungagung there are mathematical concepts, especially the concept of geometry. The concept of geometry contained in Batik Gajah Mada Sekar Jagad motif is in the form of flat shapes, geometry transformations, angles and lines. There are also several flat shapes found in this batik, namely parallelograms, ellipses and rhombuses. The transformation geometry found in this batik is mirroring.

Based on several researchers who have been tested and looking at the times that make generations have to maintain and preserve Indonesia's cultural heritage. Researchers also examined batik as part of math learning in schools. The batik is Betawi batik where when viewed from the motif itself, Betawi batik has many motifs that contain flat shapes or other mathematical concepts that might be used as teaching materials for learning mathematics. So the next researcher will explore the ethnomathematics of Betawi batik motifs in flat building learning. It is important to introduce students to batik and its motifs, especially Betawi batik motifs, as a form of preserving national culture as well as protecting the nation's cultural heritage so that it is not claimed by other parties. At the same time, it can be a mathematics learning medium for students, especially in geometry material. The purpose of this research is to explore the concept of flat shapes in Betawi batik motifs.

METHODS

Researchers use a type of qualitative research with an ethnographic approach. According to (Siddiq & Salama, 2019) Ethnography can be understood as a description of a culture, namely a description of the culture of a society which is the result of the researcher's construction of various information obtained during research in the field and with a particular problem focus. Researchers use an ethnographic approach because researchers will be directly involved in the research. This research was conducted at Thamrin City batik shopping center, Kota. DKI Jakarta. Researchers chose this location because thamrin city is a batik shopping center in the city of Jakarta, besides that the location of thamrin city also makes it easier for researchers to research Betawi batik because there are many native Betawi.

This research uses a human instrument, namely the researcher himself, where everything that happens in the field will be recorded by the researcher using exploration and observation guidelines, exploring and analyzing all documents found and presenting them in the research results (Cresswel, 2015). The research subject this time is one of the Betawi tribe communities. The data collection method used in this research consists of three parts, namely interviews, observation, and documentation. At the interview stage, researchers interviewed someone who understood all types of Betawi batik. At the observation stage, researchers made observations, then at the documentation stage, researchers collected photos so that the data that had been obtained previously. Researchers used triangulation techniques consisting of interview, observation and documentation techniques. All data obtained were documented in the form of photos, videos, and field notes, and then analyzed. The results of the analysis were processed to explore the various findings in this study. Data analysis includes processing, presenting, and drawing conclusions. To obtain a clearer picture and facilitate the next data collection process, data reduction is carried out which includes summarizing, selecting the main things, focusing on important things, looking for themes and patterns.

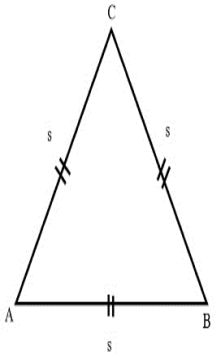
RESULTS AND DISCUSSION

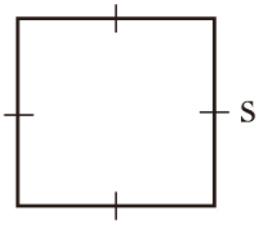
Jakarta as the capital city of Indonesia has left behind many cultural heritages that have artistic and philosophical values that are thick with the community. Based on the description that has been explained regarding the definition of ethnomathematics, Betawi batik has a

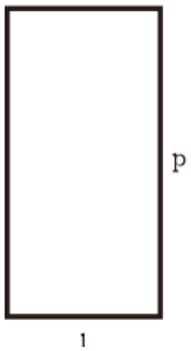
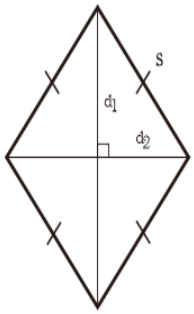
connection with ethnomathematics in the form of flat building concepts from various existing motifs.

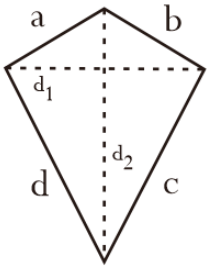
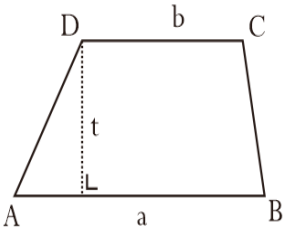
Exploration of ethnomathematics in batik betawi motifs is an activity of reviewing or analyzing information, or more detailed knowledge related to mathematical concepts in batik betawi motifs. Therefore, this research will explore ethnomathematics in Betawi batik motifs. The following are the results that researchers have found related to the concept of flat shapes in Betawi batik motifs and the implementation of the concept of flat shapes in mathematics learning which can be seen in Table 1 and Table 2.

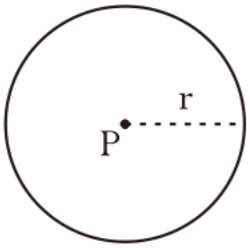
Table 1. The Concept of Flat Shapes in Batik Betawi Motifs

No.	Ethnomathematics and Implementation of Flat Shape Concept	Description of Flat Shape Concept
1.	Image Description: Batik Half Pucuk Rebung  Image Description: triangular flat shape  Betawi batik motif half pucuk rebung is used as a medium to recognize and understand the flat shape of a triangle. Therefore, by using the batik motif of pucuk rebung, students are easier to understand because the shape of the pucuk rebung motif is often encountered by students and makes students recognize the culture of the Betawi people.	Based on the analysis of the Betawi batik motif, namely half a shoot of bamboo shoots, there is the concept of a flat shape, namely a triangle. a flat shape formed from three points that are not in line, of various kinds, namely: equilateral triangle, isosceles triangle, right triangle and arbitrary triangle. properties of a square: a. Inequality in triangles: In a triangle, the largest angle always faces the longest side, and the shortest side always faces the smallest angle. b. Properties of isosceles triangles: there is one axis of symmetry and has two sides of equal length. c. Properties of an equilateral triangle: There are three three-dimensional rotational axes of symmetry and has three equal-length sides and three equal angles d. Right triangle: *Has an upright side, a flat side and a hypotenuse. *Has a right angle (90°) hypotenuse or hypotenuse in a right triangle is always located in front of the right angle. e. Arbitrary triangle *The three sides are not of equal length. *The three angles are not equal. *The sum of the three angles in a triangle adds up to 180 degrees. *Has three angles and three sides. Formula:

No.	Ethnomathematics and Implementation of Flat Shape Concept	Description of Flat Shape Concept
		Perimeter = side + side + side Area = ½ x base x height Height = (2 × Area) ÷ base Base = (2 × Area) ÷ height
2.	Image Description: Batik Nusa Kelapa  Image Description: Square Flat  The shape of the Kelapa nusa batik motif is used as a medium to recognize and understand flat square shapes. Therefore, by using the coconut nusa batik motif, students are easier to understand because the shape of the coconut nusa motif is often encountered by students and makes students recognize the culture of the Betawi people.	Based on the analysis of the Betawi batik motif, namely coconut nusa, there is a flat concept, namely a square. A square is a 2-dimensional flat shape formed by four equal-length sides and the four corner points form a right angle (90º). The properties of a square are that all sides are equal in length, all angles are equal in size, the two diagonals intersect perpendicularly and are equal in length. Formula: Area = $s \times s$ Perimeter = $4 \times s$ Side = Perimeter ÷ 4
3.	Image Description: Batik Ondel-Ondel  Image Description: Rectangular Flat Shape	Based on the analysis of the Betawi batik motif, namely ondel-ondel, there is the concept of a flat shape, namely a rectangle. Rectangle is a 2-dimensional flat shape having 2 pairs of parallel sides of equal length and 4 right angles. The nature of the Rectangle is that the facing sides are equal in length, all angles are equal in size. Formula: Area = $p \times l$ Perimeter = $2 \times (p + l)$

No.	Ethnomathematics and Implementation of Flat Shape Concept	Description of Flat Shape Concept
	 The shape of the ondel-ondel batik motif can be used as a medium to introduce and understand the shape of a rectangular flat shape. Therefore, by using batik ondel-ondel, students are easier to understand because the shape of the ondel-ondel motif is often encountered by students and makes students recognize the culture of the Betawi people.	
4.	Image Description: Batik Jali-jali  Image Description: Rhombus Flat  The shape of the betawi batik motif, namely jali jali, can be used as a medium to introduce and understand the shape of the rhombus flat shape. Therefore, by using batik motif jail-jali students are easier to understand because the shape of the jail-jali motif is often encountered by students and makes students recognize	Based on the analysis of the Betawi batik motif, namely jali jali, there is a flat concept, namely Rhombus. Rhombus is a 2-dimensional flat shape formed by 4 sides that are equal in length and have 2 pairs of non-right angles with equal angles facing each other. Its nature is that all sides are the same length, the angles are opposite. Formula: Perimeter = $s \times 4$ Area = $\frac{1}{2} \times d1 \times d2$ $S = K \div 4$ Diagonal 1 = $2 \times L \div d2$ Diagonal 2 = $2 \times L \div d1$

No.	Ethnomathematics and Implementation of Flat Shape Concept	Description of Flat Shape Concept
	the culture of the Betawi people	
5.	Image Description: Batik Betawi Pucuk Rebung  Image Description: Kite Flat  The shape of the shoots can be used as a medium to introduce and understand the shape of the kite flat. Therefore, by using the batik motif of pucuk rebung, students can more easily understand it because the shape of the pucuk rebung motif is often encountered by students and makes students recognize the culture of the Betawi people	Based on the analysis of the Betawi pucuk rebung batik motif, there is a flat concept, namely Kite. Kite is a flat shape formed by 2 pairs of equal length sides. The nature of the kite - kite is divided into 2 diagonals that differ in size. Formula: Area = ½ × $d1$ × $d2$ Perimeter = $a + b + c + d$ Perimeter = 2 × ($a + c$) Diagonal 1 = 2 × $L \div d2$ Diagonal 2 = 2 × $L \div d1$
6.	Image Caption: Batik Tugu Monas  Image Description: Trapezoid Flat  	Based on the analysis of the Betawi batik motif, namely the monument, there is a flat concept, namely the Trapezoid. Trapezoid is a two-dimensional flat shape composed of 4 sides, namely 2 parallel sides that are not equal in length and 2 other sides. Properties: a. There is a pair of parallel sides, with the longest side called the base of the trapezoid. b. The sum of the two adjacent angles or can also be called the angle in a side is 180 °. c. The total of all trapezoid angles is 360°.

No.	Ethnomathematics and Implementation of Flat Shape Concept	Description of Flat Shape Concept
	The shape of the monument and the Betawi traditional house can be used as a medium to introduce and understand the shape of the trapezoidal flat. Therefore, by using the Tugu Monas batik motif, students can more easily understand it because the shape of the Tugu Monas motif is often encountered by students and makes students recognize the culture of the Betawi people.	d. Has 1 rotary symmetry only e. Has 4 ribs and 4 elbow points Formula : $\text{Area} = \frac{1}{2} \text{x } (a+b) \text{ x } t$ $\text{Area} = \frac{(a+b) \text{ x } t}{2}$ K = *AB*+*BC*+*CD*+*DA* $\text{Height} = \frac{2\text{xL}}{(a+b)}$
7.	Image Description: Terogong Batik  Image Description: Circle Flat Shape  The shape of the batik motif, namely terogong, can be used as a medium to introduce and understand the shape of the flat circle. Therefore, by using the Terogong batik motif, students are more easily able to understand it because the shape of the Terogong motif is often encountered by students and makes students recognize the culture of the Betawi people.	Based on the analysis of the Betawi terogong batik motif, there is the concept of a flat circle. The circle is a two-dimensional flat shape formed by the set of all points that have the same distance from a fixed point. The nature of the circle is a shape that has an infinite number of folding symmetry and rotary symmetry. Formula: Rumus : diagonal = $2 \times r$ Radius (r) = $d \div 2$ $\text{Area} = \pi \text{ x } r^2$ Perimeter= π x r, $\text{Perimeter} = \pi \text{ x} d$

The researcher also managed to interview a Betawi figure named Mrs. Y who is a native descendant of the Betawi tribe. In the interview, researchers managed to get in-depth information related to the history and philosophy ranging from Betawi customs to Betawi batik. The information obtained by researchers is that Betawi itself is a mixture of various foreign cultures and local cultures. The distinctive characteristics and philosophy of Betawi batik initially resembled the northern coastal region of Java Island, but began to change since Chinese batik craftsmen entered Indonesia. Betawi batik also has the characteristic of bright

and striking colors that have a meaning regarding the life of the Betawi people, which depicts the beauty of the universe and the balance of a prosperous community life. In making Betawi batik motifs, there are also various ways, including machine-assisted making, often called printmaking, there is also making using stamped tools such as stamps and some are carved manually by hand or handmade. The following is an image of betawi batik motifs made through print machines and hand carving or handmade.

Figure 1. Betawi Batik Motifs Made with a Printing Machine

Figure 2. Betawi Batik Motifs Handmade

Based on the results of observations and interviews that have been researched above, it shows that the shapes and names of Betawi batik motifs have their own history and philosophy. Each Betawi batik motif shape also has a connection with flat shapes through ethnomathematics exploration. Mathematical flat objects found in Betawi batik motifs are triangles, squares, rectangles, rhombuses, kites, trapeziums, and circles. This is in line with research conducted by Abdullah & Rahmawati (2021) and Afifah et al. (2020).

The first shape is a triangular flat shape found in the Betawi batik motif of half pucuk rebung. The second shape is a square flat shape found in the Betawi nusa kelapa batik motif. In the second batik motif there is a meaning of the city of Jakarta in the past. The city of Jakarta is the name of the city that underwent changes during the Dutch colonial era, starting from the name Nusa Kelapa which was then changed to Sunda Kelapa which was changed continuously until finally the name Jakarta was created which describes the condition of Jakarta which is full of beautiful natural wealth, this is in line with research conducted (Oktavianti et al., 2022).

The third shape is a rectangular flat shape found in the Betawi ondel-ondel batik motif. In this third batik motif has a meaning as a form of cultural acculturation where there is an image of ondel-ondel in the batik motif and is named loreng ondel-ondel. It is said that many Betawi people believe that the creation of ondel-ondel was originally as a repellent or repel bad things (Kusumowardhani, 2017).

The fourth shape is a rhombus flat shape found in the Betawi jali-jali batik motif. In this fourth batik motif has the meaning of remembering the trees that grow a lot in the city of Jakarta, which in the past were often used as toys to make necklaces and bracelets by children. The fifth shape is a kite flat shape in the Betawi batik motif pucuk rebung which means that the Betawi people are honest and what they are.

The sixth form of trapezoidal flat shapes found in Betawi batik motifs is the monument motif. This shape has a meaning about the struggle of the Indonesian people who flared up passionately when fighting colonialism. The monument also symbolizes the high ideals to be ready to always strive to achieve prosperity and the level of living standards of people who always work together (Oktavianti et al., 2022).

The seventh form of flat circular shape in Betawi batik motif is tergogong. This batik motif has a meaning known from a village that became the center of batik craftsmen in 1960. Terogong Village has created a variety of batik motifs that are unique and quite distinctive (Kusumowardhani, 2017). The pattern uses the beauty of flora and fauna as a form of preservation.

Based on the data from the research results, its implementation in mathematics learning is also obtained as a contextual learning media in learning flat shapes. The results of the findings in this study resulted in a new understanding of Betawi batik motifs that can be used as learning media related to the real world so that students will more easily construct students' thinking about the concept of flat buildings, besides that with this research in addition to understanding flat building lessons easily students will also know their culture and preserve the culture that exists in the local community (Farhan et al., 2021). Therefore, by implementing the results of his research into mathematics learning will also show that students give a positive response where learning outcomes with culture-based are better than learning outcomes using the usual way.

CONCLUSION

Based on the results of research and discussion as well as interviews, it can be concluded that in the research on ethnomathematics exploration of Betawi batik motifs, many flat building concepts were found that can be used as mathematics learning materials. The concepts of flat shapes in Betawi batik motifs include half batik motifs with triangular flat shapes, coconut nusa batik with square flat shapes, ondel-ondel batik with rectangular flat shapes, jali-jali batik with rhombic flat shapes, pucuk rebung batik with kite flat shapes, tugu monas batik with trapezoid flat shapes, and terogong batik with circular flat shapes. These flat shapes if implemented the results of ethnomathematics exploration research into mathematics learning, this shows that students give a positive response where learning outcomes with culture-based are better than learning outcomes in the usual way. It is recommended for teachers to connect the link between Indonesian cultures such as batik because in carrying out the learning process of mathematics, especially in the material of flat shapes, there needs to be an accurate and non-abstract picture so that it helps students in understanding mathematics learning, especially the concepts of flat shapes. The connection between Indonesian culture and batik is also an effort to preserve and introduce it to students who do not know the various motifs found in Indonesian batik. To other researchers, researchers expect further research to be carried out on other Indonesian batik, so that more mathematical concepts can be found and used as mathematics learning materials.

ACKNOWLEDGEMENTS

Thank you to the management of Thamrin City at Thamrin City batik shopping center. DKI Jakarta

REFERENCES

Abdullah, A., & Rahmawati, A. (2021). Eksplorasi Etnomatematika Pada Batik Kayu Krebet Bantul. *UNION: Jurnal Ilmiah Pendidikan Matematika*, *9*(2), 163–172. https://doi.org/10.30738/union.v9i2.9531

Afifah, D. S. N., Putri, I. M., & Listiawan, T. (2020). Eksplorasi Etnomatematika pada Batik Gajah Mada Motif Sekar Jagad Tulungagung. *BAREKENG: Jurnal Ilmu Matematika Dan Terapan, 14*(1), 101–112. https://doi.org/10.30598/barekengvol14iss1pp101-112

Bishop, A. J. (1991). *Mathematics education in its cultural context. In M. Harris (ed.). School Mathematics and Work*. Academic Press. https://doi.org/10.1007/978-94-017-2209-4_4

Carel, G., Jusniani, N., & Monariska, E. (2021). Kemampuan HOTS dalam pembelajaran metakognitif ditinjau dari persepsi siswa. *Pythagoras: Jurnal Pendidikan Matematika, 16*(2), 204–216. https://doi.org/10.21831/pythagoras.v16i2.37926

Cresswel, John. , W. (2015). *Educational Research, Planning, Conducting, and Evaluating Quantitative and Qualitative ((Penerjemah: Helly Prayitno Soetjipto dan Sri Mulyantini Soetjipto*). Yogyakarta: Pustaka Pelajar.

D'ambrosio, U. (1985). Ethnomathematics and Its Place in the History and Pedagogy of Mathematics. *Source: For the Learning of Mathematics, 5*(1), 44–48.

Farhan, M., Apriyanto, M. T., & Hakim, A. R. (2021). Etnomatematika : Eksplorasi Uma Lengge Untuk Pembelajaran Matematika Di Sekolah. *Jurnal Derivat, 8*(2), 98–106.

Febrianti, T. S., & Afifi, F. C. (2022). Batik Jlamprang with Koch Snowflake and Koch Anti Snowflake Fractal Geometry using Desmos. *Ethnomathematics Journal, 3*(1). 40-50. https://doi.org/10.21831/ej.v3i1.48775

Ibrahim, S. S., & Napfiah, S. (2023). Studi Etnomatematika: Bangun Datar pada Motif Seni Rumah Budaya Sumba. *Jurnal Ilmiah Matematika Realistik (JI-MR), 4*(1), 102–111.

Iskandar, & Kustiyah, E. (2017). Batik Sebagai Identitas Kultural Bangsa Indonesia. *GEMA, XXX*(52).

Kusumowardhani, P. (2017). Identifikasi Unsur Visual Bentuk dan Warna yang Menjadi Ciri Khas Motif Ragam Hias Batik Betawi Tarogong Jakarta. *Seminar Nasional Seni Dan Desain 2017 "Membangun Tradisi Inovasi Melalui Riset Berbasis Praktik Seni Dan Desain" FBS Unesa*, 97–105.

Lestari, M., Irawan, A., Rahayu, W., & Parwati, N. W. (2018). Ethnomathematics Elements in Batik Bali Using Backpropagation Method. *Journal of Physics: Conference Series, 1022*(1). https://doi.org/10.1088/1742-6596/1022/1/012012

Mandini, G. W., & Hartono, H. (2018). Analisis kemampuan menyelesaikan soal HOTS model TIMSS dan kepercayaan diri siswa sekolah menengah pertama. *Pythagoras: Jurnal Pendidikan Matematika, 13*(2), 148-157. https://doi.org/10.21831/pg.v13i2.21234

Nisa, R. I. K., Dechandra, R. N., Maryati, W. E., & Hartati, S. P. (2023). The Position of Points, Lines and Planes in a Mosque Construction for Geometrical Visualisation. *Ethnomathematics Journal, 4*(1), 67–86. https://doi.org/10.21831/ej.v4i1.59929

Nurliastuti, E., Dewi, N. R., & Priyatno, S. (2018). Penerapan Model PBL Bernuansa Etnomatematika untuk Meningkatkan Kemampuan Pemecahan Masalah Matematis

dan Motivasi Belajar Siswa. *PRISMA, Prosiding Seminar Nasional Matematika*, *1*, 99-104.

Oktavianti, D., Hakim, A. R., Hamid, A., Nurhayati, N., & Mulyatna, F. (2022). Eksplorasi Etnomatematika pada Batik Jakarta dan Kaitannya dengan Pembelajaran Matematika. *JKPM (Jurnal Kajian Pendidikan Matematika), 8*(1), 29-44.

Richardo, R., Wijaya, A., Rochmadi, T., Abdullah, A. A., Nurkhamid, Astuti, A. W., & Hidayah, K. N. (2023). Ethnomathematics Augmented Reality: Android-Based Learning Multimedia to Improve Creative Thinking Skills on Geometry. *International Journal of Information and Education Technology*, *1*3(4), 731–737. https://doi.org/10.18178/ijiet.2023.13.4.1860

Rosa, M., & Gavarrete, M. E. (2017). An Ethnomathematics Overview: An Introduction. In Ethnomathematics and its Diverse Approaches for Mathematics Education, *ICME-13 Monographs*, 3–19). Springer International Publishing AG. https://doi.org/10.1007/978-3-319-59220-6_1

Rosa, M., Ubiratan D', Daniel, A., Orey, C., Shirley, L., Alangui, W. V, Palhares, P., & Gavarrete, M. E. (2016). *Current and Future Perspectives of Ethnomathematics as a Program ICME-13 Topical Surveys*. Retrieved from http://www.springer.com/series/14352

Sari, T. A. M., Sholehatun, A. N., Rahma, S. A., & Prasetyo, R. B. (2021). Eksplorasi Etnomatematika pada Seni Batik Madura dalam Pembelajaran Geometri. *Journal of Instructional Mathematics*, *2*(2), 71–77. https://doi.org/10.37640/jim.v2i2.1032

Siddiq, M., & Salama, H. (2019). Etnografi Sebagai Teori dan Metode. *KORDINAT, XVIII*(1), 25–48.

Sirate. (2012) . Implementasi Etnomatematika Dalam Pembelajaran Matematika Pada Jenjang Pendidikan Sekolah Dasar. *Jurnal Lentera Pendidikan*, *15*(1), 41-54.

Soedarwanto, H., Muthi'ah, W., & Maftukha, N. (2017). Kajian Ekspresi Seni dalam Ragam Hias Batik Betawi. *NARADA, Jurnal Desain & Seni*, *FDSK-UMB*, *5*(1), 67–79.

Sulaiman, R., Husain, A. H., & Sulaiman, R. (2019). Appreciation of Siri Dungun Paintings in Ethnomathematics Context. *International Journal of Academic Research in Business and Social Sciences*, *9*(9). https://doi.org/10.6007/ijarbss/v9-i9/6406

Wahyuni, A., Tias, A. J. W., & Sani, B. (2013). Peran Etnomatematika dalam Membangun Karakter Bangsa. *Seminar Nasional Matematika dan Pendidikan Matematika dengan Tema "Penguatan Peran Matematika Dan Pendidikan Matematika Untuk Indonesia Yang Lebih Baik*, 114–118.

Widada, W., Herawaty, D., Falaq Dwi Anggoro, A., Yudha, A., & Kurnia Hayati, M. (2019). Ethnomathematics and Outdoor Learning to Improve Problem Solving Ability. *1st International Conference on Educational Sciences and Teacher Profession (ICETeP 2018)*, 13–16.

Widodo, S. A., Setiana, D. S., & Irfan, M. (2021). Etnomathematics: Batik Activities in Tancep Batik. *Journal of Medives: Journal of Mathematics Education IKIP Veteran Semarang*, *5*(2), 305–315. https://doi.org/10.31331/medivesveteran.v5i2.1700