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Ethnomathematics Exploration of Simo Dance and Gringsing Batik Dance from Batang Central Java in Mathematics Learning

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Abstract

Culture in Each region's culture has unique characteristics, which are often expressed through dance. As a cultural form, dance serves as a way to express emotions through body movements. In Batang Regency, there are two folk traditions called the Simo Dance and Gringsing Batik Dance. The movements of the two dances consist of forward beksan, beksan, and backward beksan movements. This research used a descriptive qualitative method with an ethnographic approach. Observations, interviews and literature studies were carried out as data collection tools. The results indicate that mathematical concepts are present in the dances, including activities such as counting, patterns of hand and foot movements, and floor formations. These involve geometric concepts like plane shapes, spatial shapes, angles, and reflections. Further research can be developed from other aspects, such as clothing and musical notation which are related to mathematics.

Keywords: Ethnomathematics; Geometry; Gringsing Batik Dance; *Simo* Dance

Abstrak

Budaya di setiap daerah memiliki karakter tersendiri, termasuk kesenian tari. Tari sebagai bentuk budaya merupakan corak ekspresi perasaan yang dituangkan dalam gerakan tubuh. Di Kabupaten Batang, ada sebuah tradisi kerakyatan yaitu Tari *Simo* dan Tari Batik Gringsing. Gerakan kedua tari tersebut terdiri dari gerakan maju *beksan, beksan,* dan mundur *beksan.* Penelitian ini menggunakan metode kualitatif deskriptif dengan pendekatan etnografi. Adapun observasi, wawancara dan studi pustaka dilakukan sebagai tahap pengumpulan data. Hasil penelitian menunjukkan bahwa terdapat aktivitas matematika seperti menghitung, pola gerakan tangan, kaki, dan pola lantai yang menggunakan konsep geometri seperti bangun datar, bangun

ruang, sudut, dan refleksi. Penelitian lebih lanjut dapat dikembangkan kembali dari aspek lain, seperti busana, dan notasi musik serta hubungannya dengan matematika.

Kata Kunci: Etnomatematika; Geometri; Tari Batik; Tari *Simo*

Introduction

Mathematics education has a very important role in plays a crucial role in developing high-quality human resources. This is in line with the PISA results that developed countries have students who obtain high mathematics scores (OECD, 2019, 2023). The Program for International Student Assessment (PISA) is an international study that assesses education system quality by measuring outcomes in reading literacy, mathematics literacy, and science literacy among 15-year-old students. The OECD administers this assessment every three years.

Mathematical literacy is an individual's ability to formulate, apply and interpret mathematics in various contexts (Maysarah, Saragih, Armanto, & Siregar, 2024). It includes reasoning mathematically and using concepts, procedures, facts, and mathematical tools to describe, explain, or predict phenomena or incidents (Poernomo, Kurniawati, & Atiqoh, 2021). Thus, knowledge and understanding of mathematical concepts is very important, but even more important is applying mathematical literacy in solving everyday problems to solve problems faced in everyday life.

Indonesia’s results in PISA ranking have shown little improvement during its participation. In 2018 the average student mathematics literacy score was 379 and was ranked 73rd out of 79 countries (OECD, 2019). In 2022, the average student mathematics literacy score dropped to 366, placing Indonesia 70th out of 81 countries (OECD, 2023). The PISA 2022 results indicated a decline in international learning outcomes, attributed to the impact of the pandemic. Nevertheless, Indonesia's ranking in PISA 2022 rose by five places compared to PISA 2018.

This issue highlights the importance of mathematical literacy in achieving the vision of a 'Golden Indonesia 2045,' a national goal for educational and economic advancement. Therefore, learning innovation is to encourage students to better understand mathematics which is not only as concepts and formulas but as an integral part of everyday life and culture itself. In general, mathematics is often considered a linear thinking ability, related to mathematical theorems and formulas. However, this view becomes more flexible when mathematics is applied to aspects of soft skills or social skills (Hamidah, Junaedi, Mulyono, & Kusuma, 2021; Sulistiani & Masrukan, 2016).

Ethnomathematics is a response to the dominance of Eurocentric scholarship, but it does not aim to change the history of mathematics in an ethnocentric direction. According to D'Ambrosio, the term ethnomathematics refers to mathematical practices carried out by people who may be illiterate or in cultures without written expression from ancient societies (D'Ambrosio, 2006). In this context, D'Ambrosio emphasizes that the study of ethnomathematics begins with people who have little or no experience in formal or non-formal mathematics education (Sunandar, 2016; Wahyudin, 2018). The same thing was conveyed by (Vasquez, 2017) that ethnomathematics does not only discuss mathematical knowledge but includes language, values, behavior, knowledge and practices of cultural groups spread across a particular environment.

The subject of ethnomathematics studies includes various aspects such as dance patterns, weaving patterns, architecture, ornaments, common genealogical origins, and spiritual and religious centers (Habibah, Zulkarnain, & Budiarti, 2022; Jemamun, Blegur, & ..., 2023; Maisaroh & Permatasari, 2024). It also covers traditional community practices, including traditional buildings, musical instruments, batik, dance, and traditional ceremonies (N. H. M. Sari & Fahmy, 2022). A number of researchers have published the results of their research related to ethnomathematics in mathematics learning, such as the use of batik context in learning geometric transformations (Rizqi & Lukito, 2021; I. D. Sari, 2023; Syam & Pujiastuti, 2023) and number patterns in traditional games for learning geometry and numbers (Luqnia, Zahra, Ananda, & Fahmy, 2022; Rahmadhani, 2022; Susanti, 2020)

In Central Java there are three developing cultural environments, namely: the *nagaragung* cultural environment, the *wetan* and *kulon* coastal cultural environments, and the banyumasan cultural environment (Hermawan, 2017). In general, these cultures prioritize harmony and balance in life (Alifuddin & Setyawan, 2021). This emphasis on harmony and balance is reflected in the meaningful life of Javanese society. Key values include: (a) appreciation of God, such as *ukum pinesti, nrima ing pandum*, and *rila/lila*; (b) efforts to maintain both internal and external harmony, such as *tentrem* and *rukun, tepa salira, perwiro, kinasih, sak madya*, and *ngerti isin*; (c) an emphasis on feelings *(roso)*; and (d) maintaining awareness and self-control, expressed in values like *rumangsa, eling, wasphadha*, and empathy (Nugroho, 2021).

Dance as a cultural form can be interpreted as a manifestation of the expression of feelings that exist within humans, then undergoes transformation through imagination and is given form through body movements (Akanfani, Febrian Hendie, Daud, Kristina, & Padakari, 2022). A dance performance, when considered

as an artistic subject, becomes an experience that can be enjoyed and understood by the audience. This appreciation occurs through a structure that combines sensation, perception, and feeling in the audience's interpretation of the displayed movements.

Some of these art performances are the *Simo* Dance and the Gringsing Batik Dance. Based on the results of initial observations with the Batang Regency Education and Culture Office, especially in the field of culture, it was found that the *Simo* Dance and Gringsing Batik Dance are new types of local dances that were born through research based on history, and both contain philosophical values. *Simo* Dance and Gringsing Batik are instruments to convince young men and women in Batang that they have the potential to develop their region.

The object of this research is the dance arts that developed in Batang Regency originating from the Gringsing sub-district which has folk traditions, namely the *Simo* Dance and the Gringsing Batik Dance. The aim of this research is to explore the ethnomathematics found in the *Simo* dance and Gringsing batik dance. This research was chosen because the relationship between ethnomathematics and the art of dance has yet to be explored.

Cultural exploration of dance arts that have mathematical values can be used as a starting point in learning mathematics. Arthamevia, Wahyuni, & Mursyid, (2022) developed a digital comic learning media based on the Kudus kretek dance that is suitable for use in the learning process. Additionally, the Saman dance performed at the 2018 Asian Games incorporates various mathematical concepts, including flat shapes and set theory (Maryati & Pratiwi, 2019). This research aims to increase motivation among younger generations to study mathematics while preserving the cultural and socio-cultural heritage of Batang Regency, as reflected in the *Simo* Dance and Gringsing Batik Dance.

Method

This research was a descriptive qualitative study aimed at exploring the Simo and Gringsing dances in a broader context, specifically through mathematical concepts. Meanwhile, the approach in this research has used an ethnographic. According to Koentjaraningrat (2009), there are seven elements of culture that can be used as the basis for description, namely language, technological systems, economic systems, social organizations, knowledge systems, arts and religion. This approach was used because ethnomathematics research examines the relationship between culture, specifically the Simo and Gringsing dances, and mathematical concepts.

Data was obtained based on field observations, interviews, documentation and literature studies. Interview sources included Mrs. Affy Koesmoyosari, who was the head of the Culture Division of the Batang Regency Education and Culture Service; Mr. Yoyok Bambang Priyambodo, the composer of the *Simo* and Gringsing dances and an artist; and Mr. Manggih Ibrahim, a dance teacher at Warungasem Vocational School. This approach provided comprehensive information on the history, philosophical values, and specific movements of the Simo and Gringsing Batik dances. The data analysis technique is referred to as the Spradley model, which consists of domain analysis, taxonomic analysis, componential analysis, and cultural theme analysis.

Results

This research explored the mathematical concepts contained in the *Simo* dance and the Gringsing batik dance so that they could be used in mathematics learning. In more detail, it can be described as follows:

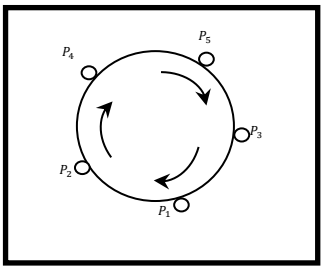
Two-dimensional figure

Several two-dimensional figures were observed in the movements of both the Simo and Gringsing Batik dances. These figures are as follows:

(a) (b)

Figure 1. (a) *Beksan* forward movement; (b) *Beksan* forward movement configuration

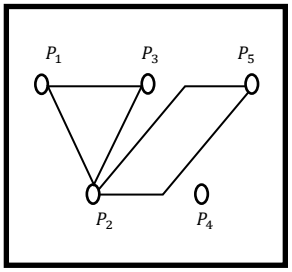
Figure 1 shows geometric concepts in the initial beksan movements of the Simo dance, specifically triangles and trapezoids. If a straight line was drawn between dancers one, two, and three, it formed a triangular shape. If a straight line was drawn between dancers two, three, four, and five, it formed a trapezoidal shape.



(a) (b)

Figure 2. (a) *Beksan* movement; (b) *Beksan* movement configuration

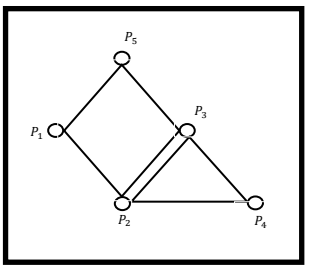
Figure 2 illustrates the geometric concept in the beksan movement, specifically a circular shape. This movement expresses a two-dimensional figure, a circle. This movement was demonstrated with the dancers circling each other around *Simo* ($\angle 360°$).



(a) (b)

Figure 3. (a) *Beksan* forward movement; (b) *Beksan* forward movement configuration

Figure 3 shows the *beksan* forward movement of the gringsing batik dance, which contains geometric concepts, namely triangles and parallelograms. When a straight line was drawn between dancers one, two, and three, it formed a triangle. Meanwhile, the straight lines drawn between dancers two, three, four, and five formed a parallelogram.



(a) (b)

Figure 4. (a) *Beksan* backward movement; (b) *Beksan* backward movement configuration

Figure 4 illustrates the beksan backward movement of the Gringsing batik dance, which included geometric concepts in the forms of rhombuses and triangles. When a straight line was drawn between dancers one, two, three, and five, it formed a triangle. Similarly, the straight lines drawn between dancers two, three, and four formed a triangle.

Angle

In this study, researchers found that geometric concepts, especially angles, played an important role in analyzing the dancer's hand and foot movement patterns. These angles enriched the expressiveness of the movement, creating a distinctive visual beauty in the context of the dance. Some types of angles observed included acute angles, right angles, obtuse angles, and straight angles.

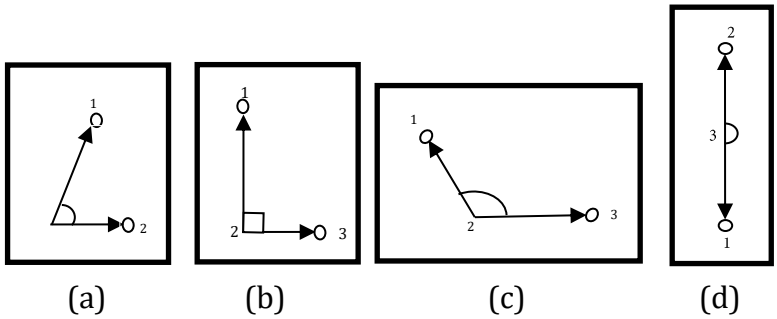
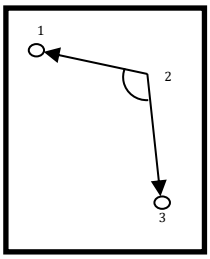


Figure 5. (a) Acute angle; (b) Right Angle; (c) Obtuse Angle; (d) Straight Angle

Acute Angle (a): An acute angle is formed when the angle is within 0° to less than 90° range. The emphasis on acute angles creates graceful and dynamic movements, adding softness to the movement patterns of the dancer's hands and feet. Right Angle (b): A right angle occurs when the measure of the angle is exactly 90°. The presence of right angles gives the impression of stability to the movement, creating a firm and well-defined focal point in the dancer's movement. Obtuse Angle (c): An obtuse angle is formed when the angle is within 90° to less than 180° range. The use of obtuse angles in a dancer's hand and foot movement patterns can produce visual contrast and add complexity and drama to the dance. Straight Angle (d): A straight angle occurs when the measure of the angle is exactly 180°. The presence of straight angles can explore more linear and symmetrical movements, creating boldness in movement patterns that may appear more formal.

(a)

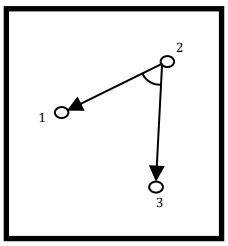


(b)

Figure 6. (a) *Beksan* forward movement; (b) *Beksan* forward movement configuration

Figure 6 shows that there is an angle concept in the *beksan* forward movement of the *Simo* dance. Both legs are static until they form >90° to regulate balance and *Simo* is swayed to the right and the left.

(a)

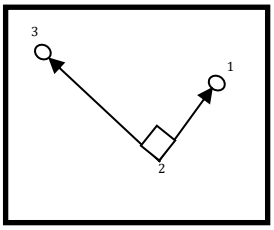


(b)

Figure 7. (a) *Beksan* forward movement; (b) *Beksan* forward movement configuration

Figure 7 shows the movements of the *beksan sekaran* with a right-left *gejug* with the position of the distance between the hands and the body forming< 90°.

(a)

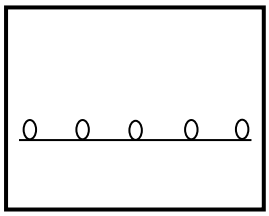


(b)

Figure 8. (a) *Beksan* movement; (b) *Beksan* movement configuration

Figure 8 shows that the *beksan* movement of the *Simo* dance jumps around until the dancer's right-hand forms an angle of 90° then rotates to the right and left.

(a)

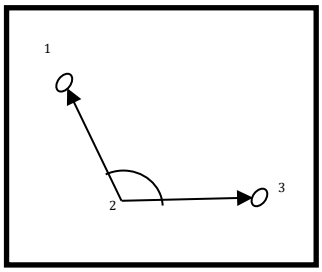


(b)

Figure 9. (a) *Beksan* movement; (b) *Beksan* movement configuration

In the movement in Figure 9, the dancers Line up in a straight formation to form a straight-line floor pattern. This shows that the Gringsing batik dance movements use the concept of geometry in the form of straight lines which are classified as one-dimensional geometry.

(a)



(b)

Figure 10. (a) *Beksan* forward movement; (b) *Beksan* forward movement configuration

Figure 10 shows the *gejug* movement while the hands lift the *canting* upwards so that both hands form an obtuse angle ($> 90°$).

Reflection

Researchers discovered the concept of geometric transformation in the form of reflections in the movement patterns of the dancer's hands, feet, and floor patterns. In this case, reflection refers to changes in position, orientation and proportion of objects or geometric patterns. The following are the properties of reflections on lines that may be found in such research:

1. Image size is equal to the object size

   This property indicates that the size or proportion of the reflected movement of the dancer's hands and feet is the same as the original movement before it was reflected.

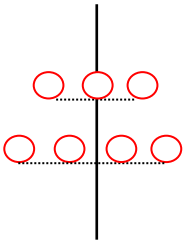
2. The distance of the image to the mirror is equal to the distance of the object to the mirror

   Shows that the distance between the position of the dancer's hands and feet as reflected in the mirror is the same as the original distance before being reflected.

3. The line connecting the object and the image is perpendicular to the mirror

   This property states that the line connecting the point on the dancer's hand or foot with the reflected image is perpendicular to the mirror surface.

(a)

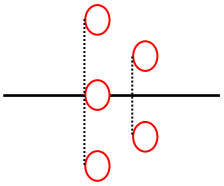


(b)

Figure 11. (a) *Beksan* forward movement; (b) *Beksan* forward movement configuration

If the right and left sides of a *Simo* dancer have the same shape, size and distance when mirrored, then the dance shows reflection.

(a)



(b)

Figure 12. (a) *Beksan* backward movement; (b) *Beksan* backward movement configuration

Gringsing batik movement pattern in Figure 12, the dancer moves by drawing a batik cloth pattern that forms an angle, where the composition of the right side dancer and the left side dancer creates a visual similarity in shape, size and distance.

Discussion

Based on the research results, there were mathematical elements in the *Simo* dance movements and the Gringsing batik dance. The results of this research were in line with previous findings which showed mathematical activities such as counting, dance composition, and designing dance movements (Gustia & Putra, 2024; Hartanti & Ramlah, 2021; Ranali & Astuti, 2023). In more detail, other mathematical activities can be described as follows.

First, the odd number pattern is used to determine the number of dancers. The equation for the odd number pattern used in this case is

$$n = 1: U_1 = 2(1) - 1 = 1\ (dancer)$$
$$n = 2: U_2 = 2(2) - 1 = 3\ (dancer)$$
$$n = 3: U_3 = 2(3) - 1 = 5\ (dancer)$$

- *and so on.*

Second, the Simo dance performance is accompanied by traditional musical instruments, including the gamelan, tambourine, jidor, and trumpet. These instruments set the rhythm that guides the dancers' counting. The Simo dance is structured into three distinct sections, with each section repeating a sequence of eight counts ("1, 2, 3, ..., 8"). For example, in a 16-beat count sequence (2×8 beats), the dancers count "1, 2, 3, ..., 8" and then repeat from "1 to 8". In sections requiring a five- to eight-beat count, dancers may adjust their timing, counting from "1, ..., 5" or "1, ..., 8," depending on the specific tempo and demands of the performance. So the counting sequences in the *Simo* dance can be detailed as follows.

1. *Beksan* forward is the initial movement in the *Simo* dance. *Beksan* forward movement is accompanied by the sound of *laras pelog* intro using *gending* instrument. This movement is divided into two parts, which are the first and second *sekaran*.
   a. The first *sekaran*, the dancers perform dance movements with a calculation of 2×8 beats in *tanjak* turning movement, right-left steps, and *besut*.
   b. The second *sekaran*, the dancers demonstrate dance movements accompanied by the *pangkur* song. The dancers perform a count of 5×8 beats on the *tanjak* foot movement, *Simo* is directed to the right and left, directed to the middle/*ngglebag*, facing backwards, and in front of the chest standing then *nggeblag*.

2. The main movement in *Simo* dance is called *Beksan*. Dancers are accompanied by the *gending lancaran laras pelog* melodies. This movement consists of the first, second, third to ninth movements called *sekaran*.
   a. The first *sekaran,* accompanied by the *gending lancaran laras pelog* melodies, the dancers perform movements with a count of 4×8 beats in *tanjak* turning movement, right-left steps, and *besut.*
   b. The second, third and fourth *sekarans,* the dancers perform movements with a count of 2×4 (1, 2, 3, 4 then repeat it 1 to 4) beats for the right and left *gejug* movements, 2×5 or 2×8 beats for the *entrakan* movement, and 1×8 beats for the *besut* movement.
   c. The second, third, and fourth sekarans, the dancers perform right-left gejug movements to a rhythm of 4 beats repeated twice (2×4). For the entrakan movement, they follow a rhythm of 5 or 8 beats repeated twice (2×5 or 2×8), and for the besut movement, they follow a single 8-beat count (1×8).
   d. The fifth *sekaran*, the dancers perform movements with a count of 2×4 beats in the right and left jumping movements, 2×5 or 2×8 beats in the *glebag* movement, and 1×8 beats in the *besut* movement.
   e. The sixth *sekaran*, the dancers perform a movement with a count of 2×8 beats in a jumping motion turning backwards and *Simo* is lifted and lowered.
   f. The seventh *sekaran* is accompanied by the *gending ladrang* rhythm of 1 barrel pelog performed in a count of 3×8 beats in the circular movements of *tanjak*, *besut*, and *gejug junjungan*, 5×4 beats in the movements of *ulap*, head-shake, *jojo*r, hands stretched *ukel* right/left, and hands are spread left and right *mangap ukel* style, 4×5 or 4×8 taps in the movement of *tanjak* shifting, *tanjak* facing backwards, clawing right/left, and upwards, 2×2 taps in the movement of moving to the side, and right hand- left tap in front, 2×5 or 2×6 taps in the movement of *ngebrok*, and ducking, 2×7 or 2×8 taps in the movement of *tanjak*, and jumping, 2×5 or 2×6 taps in the movement.
   g. The eight *sekaran*, 2×4 beats on the *tanjak* and backward movements, 2×5 or 2×8 beats during the *tawing* and *tanjak* movements, 4×8 beats on the coastal *silat*

martial art variety movements, hand-gaze up-*tanjak-glebag tanjak*, upper kick-twist-*gebrag*.

h. The ninth *sekaran* is performed in a count of 17×8 beats in the squatting movement, spear up in the middle of *ngglebag-unclang* to the front-*tanjak*, pull in, then *tusukke* to the front and up, until you take Simo.

The backward *beksan* is the closing movement, which is a depiction of *Simo*'s rise. This movement is demonstrated by dancers with 4×4 beats in the movement of the step, facing right, jumping forward and rocking right and left, 4×5 or 4×8 beats in the movement of the move, lifting the legs up, *kenjer tanjak*, and jumping, 2×8 beats in the third movement and the movement to leave the stage.

The results of this ethnomathematics exploration of the Simo dance and *Gringsing* batik contribute to the body of research exploring the cultural context of dance arts that incorporate mathematical concepts. Therefore, further research is needed to be applied in school mathematics learning. Applying ethnomathematics in school settings can foster an understanding of mathematical concepts, such as the concept of sets through *wayang* and the Mahabharata story (Risdiyanti & Prahmana, 2021), or geometry through the traditional Joglo house (Hidayat & Marsigit, 2024). This approach enables students to learn both mathematics and local culture simultaneously.

Conclusion

Based on the research results and discussions related to ethnomathematics exploration of the *Simo* dance movement and Gringsing Batik dance in Batang Regency, the researchers conclude that *Simo* Dance and Gringsing Batik are traditional arts originating from the legend of Ki Ageng Gringsing and Gringsing Batik motifs, reflecting local cultural values. The concept of geometry in dance movements is that the floor patterns of both dances show various geometric shapes such as triangles, trapezoids, parallelograms, circles, and rhombuses. Dance movements involve acute right, obtuse and straight angles. Dance compositions contain transformation concepts such as reflection, rotation, and translation. Every dance movement involves mathematical calculations, whether in hand movements, foot movements, or floor patterns. Overall, this research shows that traditional arts such as *Simo* dance and Gringsing Batik have not only aesthetic value, but also contain deep mathematical elements. This confirms that mathematics is an integral part of various aspects of life, one of which is culture. Thus, the results of this study

can be used in mathematics teaching and learning activities to foster mathematical understanding while introducing the local culture.

References

Akanfani, F. L., Febrian Hendie, A., Daud, A. K., Kristina, D., & Padakari, I. (2022). Tari Topeng Betawi: Kajian Filosofi dan Kajian Simbolis. *GETER : Jurnal Seni Drama, Tari Dan Musik*, *5*(2), 90–100. doi: 10.26740/geter.v5n2.p90-100

Alifuddin, A. U., & Setyawan, B. W. (2021). Pengaruh Budaya Dan Tradisi Jawa Terhadap Kehidupan Sehari-Hari Pada Masyarakat Di Kota Samarinda. *Jurnal Adat Dan Budaya Indonesia*, *3*(2), 67–73. doi: 10.23887/jabi.v3i2.38310

Arthamevia, A. T., Wahyuni, F. T., & Mursyid, A. Y. (2022). The Development of Digital Comics Learning Media Based Ethnomathematics of Kretek Dance Integrated with Islamic Values. *Jurnal Pendidikan Matematika (Kudus)*, *5*(2), 147. doi: 10.21043/jpmk.v5i2.16174

D'Ambrosio, U. (2006). *Ethnomathematics: Link between traditions and modernity*. Rotterdam, The Netherlands: Sense Publishers.

Damayanti, S., & Auliya, N. N. F. (2023). Eksplorasi Etnomatematika Tradisi Meron di Desa Sukolilo Kecamatan Sukolilo Kabupaten Pati. *Ar-Riyadhiyyat: Journal of Mathematics Education*, *4*(1), 11-21.

Gustia, R., & Putra, A. (2024). Aktivitas Etnomatematika pada Tari Sekapur Sirih di Kerinci. *Venn: Journal of Sustainable Innovation on Education, Mathematics and Natural Sciences*, *3*(1), 1–10. doi: 10.53696/2964-867x.133

Habibah, H., Zulkarnain, I., & Budiarti, I. (2022). Eksplorasi Etnomatematika Konsep Geometri Pada Pola Gerak Tari Tradisional Banjar Baksa Kembang. *EDU-MAT: Jurnal Pendidikan Matematika*, *10*(2), 266. doi: 10.20527/edumat.v10i2.14090

Hamidah, H., Junaedi, I., Mulyono, M., & Kusuma, J. W. (2021). Kurikulum dan Pembelajaran Matematika di Jepang dan di Indonesia. *Jurnal Pendidikan Matematika (JPM)*, *7*(2), 95. doi: 10.33474/jpm.v7i2.11425

Hartanti, S., & Ramlah. (2021). Etnomatematika: Melestarikan Kesenian dengan

Pembelajaraan Matematika. *Ideas: Jurnal Pendidikan, Sosial, Dan Budaya*, *7*(2), 33. doi: 10.32884/ideas.v7i2.347

Hermawan, A. (2017). Kliwonan dalam Perspektif Historis Dan Sosial Budaya Masyarakat Batang. *Jurnal Penelitian*, *14*(1), 135. doi: 10.28918/jupe.v14i1.800

Hidayat, I. S., & Marsigit, M. (2024, April). Implementation of mathematics learning in the context of the Joglo traditional house with the help of Geogebra. In AIP Conference Proceedings (Vol. 2622, No. 1). AIP Publishing

Izah, S. J., & Auliya, N. N. F. (2023). Pengembangan Dan Kelayakan Media Pembelajaran Karmagama (Kartu Matematika Bergambar Etnomatematika Rumah Adat Jawa). *Journal of Educational Learning and Innovation (ELIa)*, *3*(1), 193-212.

Jemamun, M. U., Blegur, I. K. S., & ... (2023). Etnomatematika pada Tarian Tradisional Nusantara dan Perannya dalam Pembelajaran Matematika. *SANTIKA: Seminar …*, 529–542. Retrieved from https://proceeding.uingusdur.ac.id/index.php/santika/article/view/1495

Luqnia, S. E., Zahra, L., Ananda, K. T., & Fahmy, A. F. R. (2022). Eksplorasi Etnomatematika Permainan Ular Tangga Pada Pembelajaran Matematika. *Prosiding Seminar Nasional Pendidikan Matematika IV*, *4*(1), 553–558.

Maisaroh, D., & Permatasari, D. (2024). Etnomatematika Dalam Tenun Troso: Konteks Pembelajaran Untuk Transformasi Geometri. *Judika (Jurnal Pendidikan Unsika)*, *12*(1), 79–93. doi: 10.35706/judika.v12i1.11076

Maryati, M., & Pratiwi, W. (2019). Etnomatematika: Eksplorasi Dalam Tarian Tradisional Pada Pembukaan Asian Games 2018. *FIBONACCI: Jurnal Pendidikan Matematika Dan Matematika*, *5*(1), 23. doi: 10.24853/fbc.5.1.23-28

Maysarah, S., Saragih, S., Armanto, D., & Siregar, H. (2024). Kemampuan literasi matematis dan keterampilan sosial melalui model project based learning. *Delta-Pi: Jurnal Matematika Dan Pendidikan Matematika*, *13*(1), 68–81. doi: 10.33387/dpi.v13i1.7076

Nino, N., & Auliya, N. N. F. (2023). Pengembangan Media Pembelajaran Permainan Tradisional Engklek Bernuansa Islami Materi Bilangan Bulat Kelas

VII. *CONSISTAN (Jurnal Tadris Matematika)*, *1*(02), 102-113.

Nugroho, K. S. S. (2021). *MIKUL DHUWUR MENDHEM JERO Nilai-Nilai Prinsip Hidup Orang Jawa* (1st ed.; Andriyanto, ed.). Klaten: Penerbit Lakeisha.

OECD. (2019). *PISA 2018 Result (Volume I): What Students Know and Can Do*. Paris: OECD Publishing. doi: https://doi.org/10.1787/5f07c754-en

OECD. (2023). PISA 2022 Result (Volume I): The State of Learning and Equity in Education. In *OECD Publishing* (Vol. 60). Paris: OECD Publishing. doi: https://doi.org/10.1787/53f23881-en

Poernomo, E., Kurniawati, L., & Atiqoh, K. S. N. (2021). Studi Literasi Matematis. *ALGORITMA: Journal of Mathematics Education*, *3*(1), 83–100. doi: 10.15408/ajme.v3i1.20479

Rahmadhani, E. (2022). Etnomatematics dan permainan trasdisional dalam pendidikan matematika. *Jurnal Pembelajaran Matematika Inovatif*, *5*(1), 81–94. doi: 10.22460/jpmi.v5i1.81-94

Ranali, R., & Astuti, H. P. (2023). Etnomatematika Pada Gerak Tari Kembang Tanjung. *OMEGA: Jurnal Keilmuan Pendidikan Matematika*, *2*(3), 111–121. doi: 10.47662/jkpm.v2i3.484

Risdiyanti, I., & Prahmana, R. C. I. (2021). Designing Learning Trajectory of Set Through the Indonesian Shadow Puppets and Mahabharata Stories. *Infinity Journal*, *10*(2), 331–348. doi: 10.22460/infinity.v10i2.p331-348

Rizqi, M. F., & Lukito, A. (2021). Eksplorasi Etnomatematika pada Motif Batik di Kampoeng Batik Jetis Sidoarjo. *MATHEdunesa*, *10*(2), 410–419. doi: 10.26740/mathedunesa.v10n2.p410-419

Sari, I. D. (2023). Eksplorasi Batik Soho Balikpapan Pada Materi Transformasi Geometri. Prosiding Seminar Nasional Pendidikan Matematika. *Universitas Mulawarman*, *3*, 192–203. Retrieved from https://jurnal.fkip.unmul.ac.id/index.php/psnpm

Sari, N. H. M., & Fahmy, A. F. R. (2022). Ethnomathematics in Javanese Death Commemoration. *Quadratic: Journal of Innovation and Technology in Mathematics and Mathematics Education*, *2*(1), 1–6. doi:

10.14421/quadratic.2022.021-01

Sulistiani, E., & Masrukan. (2016). Pentingnya Berpikir Kritis dalam Pembelajaran Matematika untuk Menghadapi Tantangan MEA. *Seminar Nasional Matematika X Universitas Semarang*, 605–612.

Sunandar, M. A. (2016). Pembelajaran Matematika SMK Bernuansa Etnomatematika. *Seminar Nasional Matematika X*, 95–105.

Susanti, E. (2020). Eksplorasi Etnomatematika Konsep Operasi Hitung dalam Permainan Tradisional Kempreng. *Suska Journal of Mathematics Education*, *6*(1), 1–8. Retrieved from http://ejournal.uin-suska.ac.id/index.php/SJME/article/view/10025

Syam, S. S., & Pujiastuti, H. (2023). Eksplorasi Etnomatematika Pada Motif Batik Cilegon Ditinjau Dari Konsep Geometri. *J-PiMat : Jurnal Pendidikan Matematika*, *5*(1), 671–682. doi: 10.31932/j-pimat.v5i1.2336

Vasquez, E. L. (2017). Ethnomathematics as an Epistemological Booster for investigating Culture and Pedagogical Experience with theYoung Offender orPrison School Communities. *Journal of Education and Human Development*, *6*(1), 117–127. doi: 10.15640/jehd.v6n2a13

Wahyudin. (2018). Etnomatematika Dan Pendidikan Matematika Multikultural. *Prosiding Seminar Nasional Pendidikan Matematika Etnomatnesia*, 1–19.

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