



Unveiling Ethnomathematical Concepts in Jathilan Art: An Ethnographic Study of Cultural Geometry and Mathematical Literacy

Deny Hadi Siswanto¹, Nur Janah², Eni Fitriana³

¹Muhammadiyah Mlati High School, ²Muhammadiyah 2 Wates Vocational School,

³Dirgantara Putra Bangsa Vocational School

Email: denysiswanto11@guru.sma.belajar.id¹, nurjanah12@guru.smk.belajar.id², enifitriana93@guru.smk.belajar.id³

Article Info

Article history:

Received November 02, 2025

Revised November 09, 2025

Accepted November 14, 2025

Keywords:

Ethnomathematics, Jathilan, Cultural Geometry, Mathematical Literacy

ABSTRACT

This study employs a qualitative approach with an ethnographic research design aimed at uncovering and describing the mathematical concepts embedded in Jathilan or Jaran Kepang, a traditional Indonesian performing art that represents part of the nation's intangible cultural heritage. The ethnographic approach enables the researcher to comprehend the meanings, symbols, and mathematical practices that are implicitly expressed within the cultural context of the community of performers. Data were collected through participatory observation, in-depth interviews with artisans, dancers, trainers, and cultural figures, as well as visual documentation and literature review to strengthen field findings. Data analysis was carried out descriptively and qualitatively through the processes of data reduction, presentation, and conclusion drawing within the framework of ethnomathematics. The findings reveal five principal ethnomathematical concepts in Jathilan: (1) planar geometry and symmetry in bamboo weaving patterns, (2) arithmetic sequences in gamelan rhythms and dance movements, (3) proportion and rotation in dancers' formations, (4) scale and ratio in costume design, and (5) fractal patterns and reflection in the decorative motifs of kuda kepeng. This study concludes that Jathilan embodies the intuitive and contextual application of mathematical principles and holds great.

This is an open access article under the [CC BY-SA](https://creativecommons.org/licenses/by-sa/4.0/) license.



Article Info

Article history:

Received November 02, 2025

Revised November 09, 2025

Accepted November 14, 2025

Kata Kunci:

Etnomatematika, Jathilan, Geometri Budaya, Literasi Matematika

ABSTRAK

Penelitian ini menggunakan pendekatan kualitatif dengan jenis penelitian etnografi yang bertujuan untuk mengungkap dan mendeskripsikan konsep-konsep matematika yang terkandung dalam kesenian Jathilan atau Jaran Kepang sebagai bagian dari warisan budaya takbenda Indonesia. Pendekatan etnografi memungkinkan peneliti memahami makna, simbol, serta praktik matematis yang tersembunyi dalam konteks budaya masyarakat pelaku kesenian. Data dikumpulkan melalui observasi partisipatif, wawancara mendalam dengan pengrajin, penari, pelatih, dan tokoh budaya, serta dokumentasi visual dan studi literatur untuk memperkuat temuan lapangan. Analisis data dilakukan secara deskriptif-kualitatif melalui proses reduksi, penyajian, dan penarikan kesimpulan berdasarkan kerangka etnomatematika. Hasil penelitian mengidentifikasi lima konsep utama etnomatematika dalam kesenian Jathilan, yaitu: (1) geometri bidang dan simetri pada pola anyaman bambu, (2) deret aritmetika dalam ritme gamelan dan gerak tari, (3) proporsi dan rotasi dalam formasi penari, (4) skala serta perbandingan pada pembuatan kostum, dan (5)



pola fraktal serta refleksi pada motif hias kuda kepang. Penelitian ini menegaskan bahwa Jathilan mencerminkan penerapan prinsip-prinsip matematis secara intuitif dan kontekstual, serta memiliki potensi besar sebagai sumber belajar berbasis budaya untuk meningkatkan literasi matematika siswa.

This is an open access article under the [CC BY-SA](#) license.



Corresponding Author:

Deny Hadi Siswanto
Muhammadiyah Mlati High School
denysiswanto11@guru.sma.belajar.id

INTRODUCTION

Mathematics is often perceived as an abstract and logical discipline, detached from the social and cultural contexts of human life. This perception leads many students to regard mathematics as difficult, intimidating, and irrelevant to their everyday experiences. In formal education, mathematics instruction tends to focus on formulas, symbols, and mechanical procedures, thereby obscuring its true nature as a product of human thought shaped by cultural experiences (Gunasekara et al., 2022). In reality, mathematics has evolved from human needs managing life, counting harvests, constructing buildings, weaving fabrics, and creating artistic works (Hatmoko et al., 2025). This perspective gives rise to the idea that mathematics is not entirely universal but also contextual and cultural in nature. One approach that emphasizes the deep relationship between culture and mathematics is ethnomathematics, introduced by D'Ambrosio (2001).

Ethnomathematics essentially examines how communities within a particular culture develop, use, and interpret mathematical concepts in their daily activities. Through this approach, mathematics is understood not merely as a set of formal rules but as an intellectual expression emerging from cultural experience (D'Ambrosio, 1985). Thus, ethnomathematics provides a new, contextual, and humanistic perspective on mathematics education rooted in social reality. In classroom practice, this approach enables students to view mathematics not just as numbers and symbols, but as an integral part of real life close to their surroundings (Astutik et al., 2025). This aligns with the 21st-century learning paradigm that emphasizes meaningful learning and the development of critical, creative, and reflective thinking skills (Rosa & Orey, 2013).

In the Indonesian context, ethnomathematics is particularly relevant due to the nation's extraordinary cultural diversity, encompassing art, architecture, cuisine, and traditional crafts. Each cultural form contains patterns and structures that reflect mathematical principles such as symmetry, proportion, patterns, geometry, and ratio (Alam et al., 2025; Wahyuni et al., 2024). Unfortunately, this potential has not been fully utilized in mathematics education. Integrating mathematical concepts with local cultural contexts can help teachers make learning more natural and enjoyable for students. Moreover, this approach supports the Merdeka Belajar (policy, which promotes education based on local wisdom and contextual understanding (Heryuriani et al., 2025; Kemendikbudristek, 2022). Therefore, exploring ethnomathematics in



Indonesian culture is an essential step toward connecting education with national cultural roots while reinforcing local identity.

One traditional art form that offers rich potential for ethnomathematical exploration is Jathilan or Jaran Kepang. Originating from Central Java and the Special Region of Yogyakarta, this folk dance features groups of performers using woven bamboo horses as props. Its rhythmic movements, accompanied by gamelan music and structured formations, exemplify the harmony of aesthetics, philosophy, and logical structure (Fatimah et al., 2024; Hanama, 2025). The Jathilan performance inherently embodies mathematical elements such as symmetry in movement patterns, rotation in dancer formations, arithmetic sequences in rhythmic beats, and proportional design in costumes and props. However, these mathematical dimensions are seldom explored scientifically, as traditional arts are often studied primarily from aesthetic, spiritual, or anthropological perspectives.

The ethnomathematical exploration of Jathilan is important because it offers significant educational value. Through the observation and analysis of forms, patterns, and structures within this art, students can realize that mathematics is not confined to textbooks it exists in their surroundings, embedded within their cultural heritage (Özcan & Bahadır, 2023). In this way, ethnomathematics serves as a bridge for fostering interest in mathematics, developing logical thinking, and strengthening cultural appreciation (Saleh et al., 2025; Suryatama et al., 2024). Furthermore, understanding mathematical concepts in traditional arts opens opportunities for developing culturally contextual teaching materials suited to Indonesian students.

Beyond education, the ethnomathematical study of Jathilan holds strategic value for preserving intangible cultural heritage. Interpreting traditional arts through scientific approaches allows society to see that culture and science are mutually enriching domains. This perspective nurtures an awareness that behind every cultural expression lies a complex and rational system of knowledge. Moreover, such studies can encourage interdisciplinary collaboration among educators, artists, and cultural researchers in designing culturally grounded learning models that teach not only mathematical concepts but also values of cooperation, precision, and creativity (Rosa & Orey, 2020).

METHOD

This study employs a qualitative approach with an ethnographic research design aimed at uncovering and describing the mathematical concepts embedded in the Jathilan or Jaran Kepang performing art as part of Indonesia's intangible cultural heritage. The ethnographic approach was chosen because it allows the researcher to understand the meanings, symbols, and mathematical practices that are implicitly expressed within the cultural context of the performing community. The researcher was directly involved in participatory observation of the creation process of performance properties (woven bamboo horses, costumes, and ornaments), dance rehearsals, and live Jathilan performances in the field. Primary data were obtained through direct observation, in-depth interviews with artisans, dancers, trainers, and cultural figures, as well as visual documentation in the form of photographs, videos, and sketches of geometric patterns found in artistic activities (Anggreni et al., 2025).

Data analysis was carried out descriptively and qualitatively through the stages of data reduction, data presentation, and conclusion drawing (Miles & Huberman, 1994). The collected data were categorized into five main ethnomathematical concepts: (1) plane geometry and



symmetry in the woven patterns of Jaran Keping, (2) arithmetic patterns and sequences in gamelan rhythms and dance movements, (3) proportion and rotational symmetry in dancer formations, (4) scale and ratio concepts in costume design, and (5) fractal and reflection patterns in Jathilan decorative motifs. The analysis was conducted using D'Ambrosio (1985) ethnomathematics framework, which asserts that cultural activities reflect distinctive forms of organization, measurement, and mathematical reasoning within each community. Data validity was ensured through source and method triangulation by comparing the results of observations, interviews, and documentation (Naufal et al., 2025).

RESULTS AND DISCUSSIONS

Geometry in the Shape and Weaving Patterns of Jaran Keping

The bamboo weaving on Jaran Keping represents one of the most tangible applications of planar geometry, symmetry, and transformation concepts in the everyday life of Javanese society. Traditional craftsmen interlace bamboo strips into intricate patterns of squares, triangles, and rhombuses with a high degree of regularity. These patterns serve not only as aesthetic elements but also as a structural reinforcement that makes the Jaran Keping both strong and flexible during the dance performance. This phenomenon shows that local communities have intuitively applied the principle of tessellation the arrangement of repeated shapes without gaps or overlaps. Furthermore, each part of the Jaran Keping exhibits both reflective and rotational symmetry, as seen in the balanced arrangement of the head and tail on both sides, symbolizing harmony between form and function.

From a mathematics education perspective, the Jaran Keping weaving can serve as a contextual medium for understanding the concepts of planar geometry and transformation. Students can analyze the basic weaving forms as combinations of regular and irregular polygons while observing how translation, reflection, and rotation naturally occur in the process of arranging bamboo strips. According to Astuti et al. (2025), Kristiamita et al. (2023) and Nursyahidah et al. (2024) emphasizes that the regularity and symmetry in cultural artifacts reveal local mathematical reasoning that develops through empirical experience and cultural values.

Similarly, Fatkhurohman et al. (2021) and Siswanto (2025) found that traditional weaving patterns hold great potential for teaching symmetry and geometric transformations in secondary schools. Their study revealed that students who learned geometry using culturally based media such as woven crafts improved their spatial ability by 28% compared to the control group. This demonstrates that ethnomathematics-based learning fosters a deeper and more meaningful understanding while promoting appreciation for local wisdom. Thus, the weaving patterns of Jaran Keping are not only artistic expressions but also mathematical learning objects that integrate conceptual understanding and cultural practice.

Example Problem: A Jaran Keping weaving pattern consists of rhombuses with diagonals of 20 cm and 12 cm. If the entire Jaran Keping body is made up of 40 identical rhombus patterns, find the total area of the weaving surface.

Solution:

$$\text{Area of one rhombus} = \frac{1}{2} \times \text{diagonal}_1 \times \text{diagonal}_2 = \frac{1}{2} \times 20 \times 12 = 120 \text{ cm}^2$$

$$\text{Total area} = 40 \times 120 = 4,800 \text{ cm}^2$$



Through this calculation, students not only learn the formula for the area of a rhombus but also understand how geometric concepts are applied in the production of traditional crafts that hold both cultural and functional value. In the ethnomathematical context, Jaran Kepang-based learning fosters awareness that mathematics is inseparable from daily life. Patterns and forms that appear simple actually embody universal mathematical principles practiced across generations. This aligns with Rahmadhani (2022) and Yanti (2025) view that every culture has its own ways of organizing, measuring, and understanding the world through patterns and shapes. Therefore, the geometric patterns of Jaran Kepang serve as a bridge between local culture and formal education, enriching students' understanding of the relationship between mathematics, art, and Indonesian cultural identity.

Rhythm and Pattern in Jathilan Dance

Jathilan or Kuda Lumping is a traditional performing art that emphasizes the interplay of movement, rhythm, and cultural symbolism. In each performance, the dancers' movements are closely synchronized with the gamelan music that accompanies them. The gamelan maintains regular beats, typically following $\frac{4}{4}$ or $\frac{8}{8}$ patterns, which reflect mathematical regularity and repetition. These beats form periodic rhythms in which each sequence of notes repeats cyclically to maintain synchronization between the dancers and the music. In mathematical terms, this rhythmic structure represents an arithmetic sequence, as the number of beats in each segment increases consistently in line with the dynamic progression of the dance. For example, the first segment may contain four beats, followed by six, eight, and so forth demonstrating a regular increase in numerical sequence.

From an ethnomathematical perspective, the rhythmic patterns in Jathilan provide an effective medium for introducing the concepts of number patterns, regularity, and arithmetic sequences in a contextual way. Students can learn that traditional music is not only artistic but also contains logical structures that can be analyzed mathematically. Ainora & Utami (2024), Nursyabana et al. (2024) and Parung (2025) explain that the rhythmic patterns of traditional Javanese gamelan music contain both arithmetic and geometric progressions, where variations in tempo or beats between segments reflect consistent mathematical relationships. Thus, the rhythmic structure of Jathilan is a real-world representation of mathematics within cultural expression, showing that mathematical reasoning can be found in traditional performing arts.

Students better comprehend mathematical concepts through concrete and familiar activities that relate directly to their lived experiences (Kintoko et al., 2025; Putri et al., 2024; Sadiyah et al., 2025). In culturally based learning, they do not merely calculate number patterns or identify abstract relationships, but they also explore the cultural meanings embedded in rhythm, movement, and symbolic expression. The rhythmic patterns found in Jathilan performances. At the same time, these patterns carry cultural significance that reflects collective identity and shared tradition. Thus, the rhythm of Jathilan contains not only mathematical value, but also nurtures focus, discipline, cooperation, and respect among students, which are essential elements in the development of character education.

Example Problem: In a Jathilan performance, the first segment has four beats, and each subsequent segment increases by two beats. If there are seven segments in total, how many beats occur throughout the performance?

Solution, Given:

$$a = 4 \text{ (initial beats)}$$



$d = 2$ (difference per segment)

$n = 7$ (number of segments)

$$S_n = \frac{1}{2}n \times (2a + (n - 1)b) = \frac{7}{2} \times (8 + 12) = 70 \text{ beats}$$

Through this problem, students can observe how arithmetic sequences operate in real cultural contexts. Such activities help students connect mathematics with time and motion key elements also used in understanding periodic functions in advanced mathematics. According to D'Ambrosio (1985), every cultural activity involves elements of counting, measuring, and patterning. In this context, Jathilan proves that mathematics is not rigid or abstract but an integral part of social and cultural life. By studying Jathilan rhythms, students develop mathematical, musical, and cultural reasoning simultaneously making mathematics learning more engaging, relevant, and meaningful.

Proportion and Symmetry in Dance Formations

In the Jathilan performance, beauty lies not only in the individual movements of the dancers but also in the carefully arranged group formations. The positioning of the dancers often forms geometric patterns such as circles, straight lines, triangles, or diagonals that harmonize with the rhythm of the gamelan music. These patterns demonstrate the application of concepts such as rotational symmetry, proportion, and geometric transformation. For example, when six dancers form a circle and rotate at equal distances from a central point, they are actually applying a rotation principle of 60° . Meanwhile, the change in formation from a straight line to a diagonal illustrates translation and rotational transformations. This spatial arrangement is designed to maintain proportional balance and visual harmony on stage, making the performance appear both cohesive and aesthetically captivating. Thus, every movement in the Jathilan dance formation not only carries artistic meaning but also reflects a deep mathematical structure.

From a mathematics learning perspective, Jathilan dance formations can be used as a contextual medium to introduce concepts such as rotational symmetry and proportion. Through the analysis of photos or videos of the performance, students can identify the center of rotation, the axes of symmetry, and the distances between performers to understand how geometric concepts are applied in real movement. This approach aligns with the principles of culturally based learning (ethnomathematics), which integrates local cultural elements with academic knowledge. According to Kofi (2023), Rif'at (2018) and Rochmat et al. (2025), the use of traditional dance formations such as Jathilan in geometry learning enhances students' visual-spatial abilities, as they are encouraged to analyze positions and shape transformations directly rather than relying solely on abstract images in textbooks.

Furthermore, research by Savaş & Köse (2023) and Suárez & González (2025) found that learning activities based on traditional arts help students develop a stronger understanding of proportion and rotational symmetry. Students who studied geometric concepts through dance formation analysis showed a 33% improvement in visual representation skills. In this context, Jathilan offers a tangible learning experience where mathematical concepts are embodied through movement, space, and rhythm. The proportional arrangement of dancers also teaches students the importance of ratio and visual balance two fundamental concepts that form the basis of many disciplines, including architecture, design, and applied mathematics.



Example Problem: Eight dancers form a circle with a diameter of 6 meters. What is the distance between two adjacent dancers?

Solution:

$$\text{Circumference} = \pi \times d = 3.14 \times 6 = 18.84 \text{ m}$$

$$\text{Distance between dancers} = \frac{18.84}{8} = 2.36 \text{ m}$$

Thus, each dancer is spaced approximately 2.36 meters apart from one another. This calculation demonstrates the application of proportionality and 45° rotational symmetry ($360^\circ:8$) in the formation of the Jathilan dance. Such mathematical reasoning reveals that traditional art forms often involve systematic geometric planning, even when applied intuitively by the community. The equal spacing between dancers reflects an awareness of proportion and spatial symmetry, serving not only an aesthetic purpose but also maintaining energetic and visual balance throughout the performance.

In line with D'Ambrosio's (1985) perspective, this phenomenon illustrates that every cultural activity possesses its own mathematical foundation, and that mathematics arises from humanity's need to organize space and time harmoniously. By integrating Jathilan formations into formal education, teachers can design learning activities such as symmetry analysis, rotation, and positional transformation using photos or dance simulations. Such practices help students realize that mathematics is not merely about numbers and formulas, but also lives within movement, form, and cultural aesthetics. Therefore, Jathilan dance serves as a meaningful bridge between academic concepts and cultural reality, fostering students' logical thinking while nurturing their appreciation for the nation's cultural heritage.

Estimation and Ratio in Costume and Property Making

The making of Jathilan costumes reflects the application of practical mathematical concepts in cultural life. Artisans who craft properties such as the jaran kepong (woven bamboo horse), barongan masks, and dancers' head ornaments usually do not rely on precise measuring tools but instead apply proportional visual comparisons based on experience. For instance, the length of the jaran kepong is adjusted to the dancer's height to ensure balance and ease of movement during the performance. This process illustrates the intuitive application of scale and units of measurement. The craftsmen understand that an object that is too large or too small would disrupt the dancer's equilibrium, thus they unconsciously employ body-to-object ratios as an inherently mathematical activity.

Proportional relationships are also evident in the ornamental design of Jathilan costumes. Male dancers' headpieces are typically larger than those of female dancers to represent strength and leadership roles within the performance. The artisans maintain harmonious proportions among length, width, and height to achieve visual balance on stage. This practice is comparable to the golden ratio concept in art and architecture, which demonstrates the close relationship between aesthetics and mathematics. Within the context of local culture, this proportional comparison represents the application of anthropometric geometry the relationship between human body measurements and artistic design.

In the context of ethnomathematics education, this aspect offers a valuable learning opportunity in schools. Students can be asked to measure and compare the scale between a miniature version and a full-sized Jathilan costume. For example, if a miniature jaran kepong is 40 cm long while the real one measures 160 cm, the scale ratio is 1:4. Through this activity, students learn that comparing similar dimensions reflects the mathematical concept of scale,



which is also used in maps, architectural plans, and product design. Such contextual learning allows students not only to perform calculations but also to understand how mathematics is embedded in cultural practices.

Example Problem: A miniature jaran kepeng is 50 cm long and 25 cm tall. The real version is 200 cm long. What should be its height to remain proportional?

Solution:

$$\text{Scale} = 1:4$$

$$\text{Actual height} = 25 \times 4 = 100 \text{ cm}$$

This shows the relationship between mathematical ratios and cultural craftsmanship. As Hidayana & Lianingsih (2025), Nur et al. (2020) and Syah et al. (2024) emphasize, contextual learning rooted in local culture enhances students' understanding of abstract mathematical ideas. D'Ambrosio (2001) further argues that mathematics in cultural practices demonstrates the natural link between logical reasoning and social tradition.

Fractal Patterns and Aesthetic Motifs in Jathilan Ornaments

The decorative motifs on Jathilan properties, particularly the jaran kepeng, are rich in both aesthetic and mathematical significance. Patterns such as flames, multi-petal flowers, and repeating spirals embody concepts of fractals and reflective symmetry. A fractal pattern exhibits self-similarity, meaning that smaller parts resemble the overall shape. In the context of Jathilan, flame motifs are often repeated from the center outward with decreasing size, representing a natural example of geometric iteration that enhances the visual rhythm and harmony of the artwork.

From a mathematical perspective, these designs demonstrate geometric repetition and bilateral symmetry. Traditional craftsmen intuitively maintain visual balance by mirroring motifs on both sides of the jaran kepeng. The repetition of basic geometric elements such as triangles, curves, and spirals creates complex layered patterns that mirror the principles of transformation geometry, including translation, rotation, and reflection. These geometric relationships show that traditional artisans apply mathematical reasoning in their creative process, even without formal mathematical training.

In the context of ethnomathematics education, the study of Jathilan motifs can serve as a meaningful bridge between mathematics and cultural expression. Students can explore fractal and symmetry concepts through activities like redrawing motifs or using digital tools to analyze repeating shapes and ratios. Such learning experiences not only introduce mathematical ideas like scaling and iteration but also foster appreciation for how mathematical thinking is embedded in local art traditions. Ultimately, these motifs highlight the harmony between mathematical logic and cultural aesthetics within Indonesia's intangible heritage.

Example Problem: A flame motif consists of three triangular shapes repeated with a ratio of $1:\frac{1}{2}:\frac{1}{4}$. If the first triangle is 8 cm long, what is the total combined length?

Solution:

$$8 + 4 + 2 = 14 \text{ cm}$$

This demonstrates a geometric series, a key feature of fractal design. Adiyanti (2024), Hijriyanti et al. (2025) and Khasanah et al. (2025) showed similar findings in Javanese batik, where local artisans intuitively apply fractal and symmetry principles. D'Ambrosio (2001) likewise notes that traditional cultural activities often contain sophisticated mathematical ideas even without formal education. Thus, the motifs of Jathilan are not merely decorative; they



embody mathematical thinking, aesthetic intelligence, and cultural heritage, reflecting how traditional societies naturally practice advanced Jathilan geometry in daily life.

CONCLUSION

The traditional cultural elements encompass a variety of rich and meaningful mathematical concepts, including plane geometry and symmetry in bamboo weaving, arithmetic patterns in gamelan music rhythms, proportion and rotation in dance formations, scale and comparison in costume making, as well as fractal and reflection patterns in the decorative motifs of the jaran kepong horse figures. All these elements demonstrate that traditional communities have intuitively and contextually applied mathematical principles in their daily lives. These findings reinforce D'Ambrosio's theory that mathematics is a cultural product emerging from humanity's need to understand and organize its environment. Therefore, Jathilan can serve as a contextual learning resource to enhance students' mathematical literacy while simultaneously instilling local cultural values. It is recommended that educators integrate local cultural elements such as Jathilan into mathematics instruction through ethnomathematical approaches, including creative projects, pattern analysis, or culture-based learning practices. Beyond strengthening conceptual understanding, this strategy also fosters appreciation for Indonesia's cultural heritage and promotes learning that is more meaningful, humanistic, and contextually grounded.

REFERENCES

- Adiyanti, P. A. (2024). The preservation of batik through technology: The role of batik fractal and jbatik software. *Proceedings Bali Bhuwana Waskita: Global Art and Creativity Conference*, 4, 239–250.
- Ainora, E. P., & Utami, N. W. (2024). Revealing the traditional music of Gamelan: A mathematical content for elementary students. *Journal of Honai Math*, 7(1), 123–138. <https://doi.org/10.30862/jhm.v7i1.465>
- Alam, S. R., Siswanto, D. H., & Aprilia, D. (2025). Implementasi pembelajaran STEM terintegrasi computational thinking untuk meningkatkan kemampuan pemecahan masalah murid. *Papanda Journal of Mathematics and Science Research*, 4(1), 40–50.
- Anggreni, P., Mutoharoh, Huriaty, D., Sofyan, A., Friyatmi, Nurfahrunnisa, A., Rizki, A. I., Agus, A. A., Alamsyah, M. N., Tarso, & Siswanto, D. H. (2025). *Evaluasi Program Pendidikan: Konsep, Model dan Studi Kasus*. Padang: Literasi Langsung Terbit.
- Astuti, A. F., Yusup, R., & Fahmi, S. (2025). Implementasi etnomatematika pada anyaman bambu: Upaya peningkatan hasil belajar pada materi geometri bangun datar. *Pendas: Jurnal Ilmiah Pendidikan Dasar*, 10(02), 248–259.
- Astutik, W. D., Siswanto, D. H., & Kintoko. (2025). Penerapan RME: Peningkatan Prestasi Belajar Matematika Murid. *Murabbi*, 4(1), 46–56. <https://doi.org/10.69630/jm.v4i1.61>
- D'Ambrosio, U. (1985). Ethnomathematics and its place in the history and pedagogy of mathematics. *For the Learning of Mathematics*, 5(1), 44–48.
- D'Ambrosio, U. (2001). Ethnomathematics: Link Between Traditions and Modernity. In *Sense Publishers*.



- Fatimah, S., Tri Sulistiyono, S., Alhadi, Z., Hidayat, H., & Patra, H. (2024). Local wisdom of multicultural communities in the maritime history network to prevent the nation disintegration. *KnE Social Sciences*, 2024, 189–208. <https://doi.org/10.18502/kss.v9i2.14847>
- Fatkurohman, F., Ayuningtyas, A. D., Noto, M. S., & Widodo, S. A. (2021). Etnomathematics: Exploration of Geblek Renteng Batik in Transformation Geometry. *Numerical: Jurnal Matematika Dan Pendidikan Matematika*, 5, 79–90. <https://doi.org/10.25217/numerical.v5i2.1506>
- Gunasekara, A. N., Turner, K., Fung, C. Y., & Stough, C. (2022). Impact of lecturers' emotional intelligence on students' learning and engagement in remote learning spaces: A cross-cultural study. *Australasian Journal of Educational Technology*, 38(4), 112–126. <https://doi.org/10.14742/ajet.7848>
- Hanama, A., & Siswanto, D. H. (2025). Art in the Muhammadiyah Islamic View: A Balance of Aesthetics and Ethics. *Asian Journal of Philosophy and Religion (AJPR)*, 4(1), 47–60. <https://doi.org/10.55927/ajpr.v4i1.13114>
- Hatmoko, F. T., Wahyuni, N., Shahidayanti, T., & Siswanto, D. H. (2025). Maksimalisasi Kemampuan Pemecahan Masalah Matematika melalui Penerapan Model PBL pada Siswa SD. *Murabbi*, 4(1), 13–21. <https://doi.org/10.69630/jm.v4i1.51>
- Heryuriani, B., Efendi, R., Rambe, M. Y., & Siswanto, D. H. (2025). Fostering Academic Self-Efficacy in Adolescents: A Case Study of Counseling Strategies in Secondary Schools. *JUPERAN: Jurnal Penedidikan Dan Pembelajaran*, 04(02), 667–675.
- Hidayana, R. A., & Lianingsih, N. (2025). Contextual Learning as a Means to Improve Elementary School Students' Mathematical Literacy Skills. *International Journal of Ethno-Sciences and Education Research*, 5(2), 46–50.
- Hijriyanti, P., Sianturi, Y. D., Putri, A., & Simanjorang, M. M. (2025). Pemahaman etnomatematika dalam kearifan lokal suku Baduy dan Suku Dayak. *Jurnal Pengabdian Masyarakat Dharma Andalas*, 03(02), 142–154. <https://doi.org/10.47233/jpmda.v1i1.517>
- Kemendikbudristek. (2022). *Pedoman penerapan kurikulum dalam rangka pemulihan pembelajaran*.
- Khasanah, A. U., Kartika, I. D., Wulandari, D. P., & Satrio, A. (2025). Eksplorasi etnomatematika pada corak batik tradisional solo dan kaitannya dengan pembelajaran matematika. *Jurnal Inovasi Pembelajaran Matematika: PowerMathEdu*, 04(02), 417–434.
- Kintoko, Siswanto, D. H., Pamungkas, M. D., & Aisyah, A. K. (2025). Analysis of students' mathematical literacy skills on the Pythagorean Theorem in Junior High School. *JOELI: Journal of Educational and Learning Innovation*, 1(3), 180–190. <https://doi.org/10.72204/j6t4a573>
- Kofi, M. (2023). Enhancing High School Students' Spatial Reasoning Through Geometry Transformation Instruction in Ghana. *Doctoral Thesis, University of Calgary, Calgary, Canada*, 1–193. <https://doi.org/https://prism.ucalgary.ca>
- Kristiamita, A., Maharani, P. A., & Astuti, E. P. (2023). Eksplorasi etnomatematika kerajinan anyaman bambu sebagai sumber belajar matematika pada materi geometri. *Juring (Journal for Research in Mathematics Learning)*, 6(3), 265–276.



<https://doi.org/10.24014/juring.v6i3.25521>

- Miles, M. B., & Huberman, A. M. (1994). Qualitative Data Analysis: An Expanded Sourcebook. In *Qualitative Data Analysis: An Expanded Sourcebook* (pp. 1–318).
- Naufal, N., Apriani, F., Fajriana, Nurdin, Nurdin, K., & Siswanto, D. H. (2025). *Analisis Multivariat*. Padang: Literasi Langsung Terbit.
- Nur, A. S., Waluya, S. B., Rochmad, R., & Wardono, W. (2020). Contextual learning with Ethnomathematics in enhancing the problem solving based on thinking levels. *Journal of Research and Advances in Mathematics Education*, 5(3), 331–344. <https://doi.org/10.23917/jramathedu.v5i3.11679>
- Nursyabana, A., Syaputra, I. M., Abyyughofar, M., Faridh, A., & Fahmy, R. (2024). Eksplorasi Etnomatematika pada Pola Ritmis dan Struktur Komposisi Instrumen Musik Darbuka. *Prosiding Santika 4: Seminar Nasional Tadris Matematika UIN K.H. Abdurrahman Wahid Pekalongan*, 268–281.
- Nursyahidah, F., Wardono, & Susilo, B. E. (2024). Eksplorasi etnomatematika pada tradisi adat sesaji rewandha Jawa Tengah sebagai konteks pembelajaran untuk mendukung kemampuan numerasi siswa. *Proximal: Jurnal Penelitian Matematika Dan Pendidikan Matematika*, 7(2), 854–863. <https://doi.org/10.30605/proximal.v5i2.4121>
- Özcan, Ö., & Bahadır, E. (2023). Opinions of mathematics teachers and pre-service teachers about the relationship between mathematics and culture. *European Journal of Education Studies*, 10(10), 420–451. <https://doi.org/10.46827/ejes.v10i10.5053>
- Parung, C. (2025). Exploring music and visual art relationship through inquiry graphic: A semiotic analysis of visual art students' work. *Arts and Humanities in Higher Education*, 24(1), 88–117. <https://doi.org/10.1177/14740222241292804>
- Putri, H. A., Hardi, Y., Alghiffari, E. K., & Siswanto, D. H. (2024). Penerapan Teknik Mindfulness dalam Proses Pembelajaran di Sekolah Menengah Atas. *Jurnal Praktik Baik Pembelajaran Sekolah Dan Pesantren*, 3(03), 152–162. <https://doi.org/10.56741/pbpsp.v3i03.733>
- Rahmadhani, E. (2022). Etnomatematika dan Permainan Tradisional dalam Pendidikan Matematika. *Jurnal Pembelajaran Matematika Inovatif*, 5(1), 81–94. <https://doi.org/10.22460/jpmi.v5i1.81-94>
- Rif'at, M. (2018). The Exploring of Visual Imagery: In their Relation to the Students' Mathematical Identity. *Higher Education Research*, 3(5), 75–91. <https://doi.org/10.11648/j.her.20180305.11>
- Rochmat, S., Andriyani, & Siswanto, D. H. (2025). Developing an RME-based 3D storybook with AR technology to enhance spatial ability. *Bulletin of Applied Mathematics and Mathematics Education*, 5(1), 9–22. <https://doi.org/10.12928/bamme.v5i1.10880>
- Rosa, M., & Orey, D. C. (2013). Ethnomodelling as a Research Lens on Ethnomathematics and Modelling. *International Perspectives on the Teaching and Learning of Mathematical Modelling*, 6(2), 117–127. https://doi.org/10.1007/978-94-007-6540-5_10
- Rosa, M., & Orey, D. C. (2020). Principles of Culturally Relevant Education in an Ethnomathematical Perspective Milton. *Revista De Educação Matemática*, 17(32), 1–24. <https://doi.org/10.37001/remat25269062v17id306>



- Sadiyah, K., Setiawan, A., Siswanto, D. H., & Fitriyani. (2025). Self-efficacy, learning styles, and learning discipline as predictors of mathematics achievement among vocational school students. *Jurnal Ilmiah Multidisiplin Ilmu*, 2(3), 138–148. <https://doi.org/10.69714/40sjf608>
- Saleh, F., Manalu, E. O., Amrizal, Nugroho, D. H., Pujowati, M., Siswanto, D. H., Rosnelli, Septikasari, D., Radhiyani, F., Rizku, A. I., Sabandar, V. F., & Tarso. (2025). *Kurikulum dan Pengembangan Kurikulum*. Padang: Literasi Langsung Terbit.
- Savaş, G., & Köse, N. Y. (2023). Pre- service mathematics teachers ' abstraction of rotational symmetry. *Journal of Pedagogical Research*, 7(3), 263–286. <https://doi.org/10.33902/JPR.202319685>
- Siswanto, D. H. (2025). Mathematical Interpretation of the Geblek Renteng Batik Theme: Exploring Geometric Transformations. *Journal of Pedagogy and Education Science (JPES)*, 4(01), 36–50. <https://doi.org/10.56741/jpes.v4i01.664>
- Suárez, Y. M. S., & González, M. M. (2025). Curricular integration of mathematics and dance to improve geometric reasoning in secondary school students. *RGSA: Revista de Gestão Social e Ambiental*, 19(1), 1–41. <https://doi.org/10.24857/rgsa.v19n1-102>
- Suryatama, H., Saputra, S. A., Siswanto, D. H., & Kevin, E. (2024). Penerapan konsep segitiga restitusi untuk mengembangkan budaya positif di sekolah dasar. *MURABBI*, 3(1), 70–78. <https://doi.org/10.69630/jm.v3i2.40>
- Syah, A. B. P. D. A. F., Rachmawati, L., & Siswanto, D. H. (2024). Validity and practicality of the game-based learning media for mathematical logic using the quiz whizzer application. *JOELI: Journal of Educational and Learning Innovation*, 1(2), 107–118. <https://doi.org/10.72204/xpxg2d74>
- Wahyuni, N., Alam, S. R., Alghiffari, E. K., & Siswanto, D. H. (2024). Harnessing TikTok for learning: Examining its impact on students' mathematical numeracy skills. *Journal of Professional Teacher Education*, 02(02), 48–56. <https://doi.org/10.12928/jprotect.v2i2.945>
- Yanti, S. (2025). The Role of Etnomathematics in Enhancing Contextual Mathematics Understanding Among Student. *International Journal of Humanity Advance Business & Science*, 2(4), 321–330. <https://doi.org/10.59971/ijhabs.v2i4.402>