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Exploring Ethnomathematics in Scout Marching Drills: Geometry, Deep Learning, and Islamic Values

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ABSTRACT

This study examines ethnomathematical concepts embodied in Scout marching drills and analyzes their relevance to Deep Learning and Islamic educational values. A qualitative descriptive design with an exploratory ethnographic orientation was implemented at UPT SMP Negeri 2 Gadingrejo. Data were collected through observation of movements, visual documentation, a semi-structured interview with one Scout leader, and a literature review. The data were analyzed through reduction, display, and conclusion drawing, with source and method triangulation used to enhance trustworthiness. The findings indicate that the attention stance models a vertical line; right-dress alignment models a horizontal line; the salute approximates an acute angle; right and left turns represent a quarter-turn rotation or a 90° angle; and row-and-column arrangements approximate a rectangle. These representations can be developed into classroom activities involving coordinates, angle measurement, distance, slope, rotation, perimeter, area, and model validation. The activities support meaningful, mindful, and joyful learning while embodying order, responsibility, cooperation, and solidarity. The study contributes a novel perspective by extending Scout ethnomathematics from static pioneering artefacts to dynamic bodily movements and by integrating geometry, Deep Learning, and Islamic values.

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INTRODUCTION

Scouting provides a form of non-formal education within schools that integrates physical training, character formation, social skills, and organizational experience. One of its most recognizable activities is marching drill. Participants are required not only to follow commands but also to regulate their posture, direction of gaze, spacing, timing, and body position so that their movements remain coordinated with those of the group. Marching drill may therefore be understood as a spatial and rhythmic practice in which bodies are positioned, moved, and aligned according to shared rules. Such activities cultivate discipline, responsibility, cooperation, precision, and awareness of one's position within a collective (Rismawati & Istiyati, 2025).

From a mathematical perspective, Scout marching drills involve positional points, lines, direction, distance, angles, parallelism, perpendicularity, rotation, recurring patterns, and two-dimensional formations. These elements are rarely named in formal mathematical terms during practice, yet they are embodied in participants' postures and spatial relationships. An upright stance can be modeled as a vertical line; an arm extended parallel to the ground as a horizontal line; a change in facing direction as a rotation; and an arrangement of rows and columns as a plane figure. Mathematics, therefore, is not an ornament imposed after the activity; it is part of the structure that enables movements to be performed accurately and synchronously.

Ethnomathematics provides a framework for interpreting these structures. D'Ambrosio (2006) conceptualizes ethnomathematics as the ways in which a group develops, uses, and transmits mathematical ideas within its lived context. Such groups are not limited to ethnic communities; they may also include professional communities, organizations, and social practices with distinctive rules, language, symbols, and modes of operation. Within Bishop's (1988) framework, locating, measuring, designing, counting, playing, and explaining constitute universal mathematical activities that assume culturally specific forms. Scouting reflects these characteristics through its movement protocols, command terminology, formation patterns, and collective values transmitted through practice.

A growing body of research demonstrates that cultural contexts can help students understand mathematics more concretely. Studies of Javanese culture, wayang, batik, traditional musical instruments, and dance movements show that geometry, transformation, measurement, and pattern can be developed from experiences close to students' lives (Lubis et al., 2018; Naja et al., 2021; Prahmana & D'Ambrosio, 2020; Risdiyanti & Prahmana, 2018, 2021). The integration of ethnomathematics-based teaching materials may also enhance the relevance of instruction and enable students to connect school mathematics with their social environment (Wulandari et al., 2024).

Within Scouting, previous studies have predominantly examined constructive and static objects. Hidayatulloh (2024) identified triangles, rectangles, angles, symmetry, length, and ratio in Scout tents. Hidayatulloh and Suminto (2024) found plane and solid figures, parallelism, similarity, angles, and ratios in pioneering gate structures. Soebagyo and Noer (2023) likewise reported triangular pyramids, trapezoids, rhombi, rectangles, transformations, and parallel and intersecting lines in Scout gates. Ardiyanti et al. (2024) further showed that pioneering activities can promote interest and creativity in mathematics learning. These studies establish Scouting as a productive mathematical context, but their analyses remain centered on objects whose forms are relatively fixed.

Marching drills differ conceptually from tents or gates because their mathematical relationships are produced by bodies moving through time. Lines emerge when posture and alignment are maintained; angles are formed when limbs bend or the direction of a formation changes; and plane figures arise when multiple positions are coordinated. Movement introduces temporal sequencing, motor coordination, decision-making, and group regulation. This distinction is important because ethnomathematical analysis should not stop at identifying shapes; it should also explain how those shapes are produced, maintained, corrected, and interpreted within a cultural practice.

This relationship is also relevant to the Deep Learning framework. Kementerian Pendidikan Dasar dan Menengah Republik Indonesia (2025) defines Deep Learning as an approach that honors learners through mindful, meaningful, and joyful learning experiences while integrating the development of intellect, character, sensibility, and physical capacities. Internationally, the anticipation-action-reflection cycle emphasizes that learners deepen their understanding when they plan an action, experience its consequences, evaluate evidence, and refine their thinking (OECD, 2018, 2019). This perspective is consistent with learning that requires active engagement, collaboration, knowledge transfer, and authentic contexts (Fullan et al., 2018; Hattie, 2023).

The relationship between ethnomathematics and Deep Learning cannot be established merely by displaying a photograph of a Scout activity at the beginning of a lesson. The cultural context must function as a source of problems, data, actions, representations, and reflection. Students may estimate an angle before moving, measure their positions after moving, compare an actual formation with an ideal model, explain the causes of deviation, and propose improvements. Within this sequence, learning becomes meaningful because it begins with familiar experience; mindful because students understand the purpose, strategy, and accuracy of their actions; and joyful because mathematical reasoning is developed through movement and collaborative activity rather than through symbolic exercises alone (Fatmawaty, 2024; Khasanah et al., 2025).

Islamic values should likewise be integrated analytically rather than added ceremonially. Marching drills require order, responsibility, adherence to agreed rules, mutual adjustment, and the maintenance of group cohesion. These values can be interpreted through Qur'anic messages concerning orderly ranks and cooperation in goodness. The following verse provides an ethical basis for reflecting on collective order; it is not intended to equate an educational activity with the military context referred to in the verse.

إِنَّ اللَّهَ يُحِبُّ الَّذِينَ يُقَاتِلُونَ فِي سَبِيلِهِ صَفًّا كَأَنَّهُمْ بُنْيَانٌ مَرْصُوصٌ

"Indeed, Allah loves those who fight in His cause in ranks, as though they were a solidly joined structure"
(Qur'an, al-Saff [61]: 4; Kementerian Agama Republik Indonesia, 2019).

In an educational context, the metaphor of a solid formation can be used to reflect on how the accuracy of each individual position contributes to collective order. The value of cooperation is also consistent with Qur'an, al-Ma'idah [5]: 2, which calls for mutual assistance in righteousness and piety. Majid et al. (2025) show that integrating tawhid values into mathematical learning experiences can broaden education from conceptual mastery toward ethical awareness. Geometry learning through marching drills may therefore connect mathematical precision with responsibility, solidarity, and mutual respect.

On the basis of this review, the research gap lies in the limited number of studies that position marching drills as a dynamic ethnomathematical practice while translating their findings into a Deep Learning design and a reflection on Islamic values. This study addresses three questions: (1) Which geometric concepts are represented in Scout marching movements and formations? (2) How can these representations be translated into meaningful, mindful, and joyful learning activities? and (3) Which Islamic values can be reflected through the order inherent in collective movement? The novelty of the study lies in integrating four analytical layers: movement evidence, mathematical representation, learning-experience design, and value-based meaning. The study aims to produce a mapping that mathematics teachers and Scout leaders can use as a contextual resource for geometry learning.

METHOD

This study employed a qualitative descriptive approach with an exploratory ethnographic orientation. The design was selected because the study did not test the effectiveness of an intervention; instead, it interpreted mathematical concepts embedded in marching drills within their natural context. The study was conducted at UPT SMP Negeri 2 Gadingrejo. Data collection and analysis took place during the first semester of the 2025/2026 academic year through a series of routine Scout training sessions and a review of the available documentation.

Participants were selected purposively. The primary informant was one Scout leader who understood movement standards, the purposes of commands, training patterns, and the educational values underlying the activity. The visual observation unit comprised ten students shown in the principal documentation and performing the movements as a group. The students served as sources of movement and formation data rather than as test respondents. The analysis focused on the attention stance, right-dress alignment, salute, right or left turn, and row-and-column arrangements.

The research instruments consisted of a semi-structured interview guide, a movement-observation sheet, a documentation checklist, field notes, and a geometry-coding sheet. The interview guide included questions concerning the purposes of movements, indicators of accuracy, and the meanings of discipline, coordination, and solidarity. The observation sheet was used to record the positions of the head, torso, and feet; arm direction; changes in facing direction; spacing between participants; row-and-column arrangements; and movement synchrony. Photographic and video documentation enabled repeated examination of movement sequences and helped distinguish precise mathematical forms from visual approximations caused by camera perspective and natural variation in human bodies.

Trustworthiness was strengthened through source triangulation and method triangulation. Source triangulation involved comparing the Scout leader's explanations, students' movement evidence, visual documentation, and formal marching regulations. Method triangulation involved cross-checking observations, interviews, documentation, and the literature review. A geometric label was retained only when the visual relationship and the description of the movement produced a consistent interpretation. In the source manuscript, interview data were available as analytical notes rather than as a word-for-word transcript; the findings were therefore reported as paraphrases to avoid constructing undocumented verbatim quotations.

Data analysis followed the interactive model proposed by Miles, Huberman, and Saldaña (2014). During data reduction, the training sequence was divided into movement units, relevant frames were selected, and four dimensions were coded: bodily or positional evidence, mathematical relationships, meanings within the practice, and potential educational applications. The data were displayed through narrative descriptions, annotated figures, and a movement-concept matrix. Conclusions were drawn by comparing codes across sources, relating them to geometric definitions and previous studies, and formulating pedagogical implications. The analysis did not treat students' bodies as perfectly ideal geometric forms; rather, it considered them models or approximations that could be tested and refined through measurement.

Table 1. Data sources, instruments, and analytical functions

Data source and instrument	Data collected	Analytical and validation function
Scout leader interview guide	Purposes of commands, indicators of accuracy, discipline, coordination, and solidarity.	Interpret the practice and compare explanations with movement evidence.
Students observation sheet	Posture, arm direction, changes in orientation, spacing, rows, columns, and synchrony.	Identify mathematical relationships embodied in bodies and formations.
Photographs/videos coding sheet	Movement frames, relative positions, and possible perspective distortion.	Review, annotate, and compare actual forms with mathematical models.
Literature/regulations review matrix	Geometric definitions, movement procedures, and findings from previous studies.	Strengthen interpretation and source triangulation.

RESULTS AND DISCUSSION

The analysis revealed that Scout marching drills embody geometric concepts at three levels. The first is the individual-body level, including the vertical axis of the body and angles formed by the arms. The second is the movement-transition level, such as a quarter-turn rotation during a right or left turn. The third is the relational level among participants, including parallelism, distance, rows and columns, and rectangular formations. The findings are discussed in relation to movement evidence, conceptual accuracy, cultural meaning, and pedagogical implications.

Vertical and Horizontal Lines

Figure 1. (a) The attention stance as a model of the body's vertical axis; **(b)** The horizontal relationship in row alignment.

Source: Research documentation, 2025; geometric annotations prepared by the authors.

In the attention stance, the head, torso, and feet are positioned along an upright direction relative to the ground. This relationship can be modeled as a vertical line or as a line parallel to the y-axis in the Cartesian plane. The term "modeled" is important because the human body has volume and contours and is therefore not a line in the axiomatic sense. A vertical line is an abstract representation of the body's axial tendency. Postural errors can be discussed as deviations from a reference axis, such as an inclination of several degrees from the vertical.

The right-dress movement and the alignment of shoulders or participants within a row display a horizontal relationship. In the Cartesian plane, this relationship can be represented by points with the same y-coordinate or by a line parallel to the x-axis. When several rows are arranged at uniform intervals, parallel lines emerge. When the vertical axis of posture is compared with the horizontal line of the formation, the two relationships are perpendicular. A single activity can therefore connect points, line segments, parallel lines, and perpendicularity.

This finding extends previous ethnomathematical analyses of Scouting, in which lines were primarily associated with ropes, poles, tents, or gate structures (Hidayatulloh, 2024; Hidayatulloh & Suminto, 2024; Soebagyo & Noer, 2023). In marching drills, lines are produced and maintained by bodies that continuously adjust their positions. Mathematical concepts are thus embedded not only in a final product but also in the process of coordination.

In the classroom, teachers may ask students to photograph the attention stance from the side, superimpose a vertical reference line, and measure the angle of deviation using a digital protractor or dynamic geometry software. To investigate horizontal relationships, students may assign coordinates to several participants, determine whether their y-coordinates are equal, and calculate the distances between positions. The task is meaningful because it begins with students' Scouting experience, mindful because they evaluate the accuracy of their model, and joyful because data are collected through collaborative physical activity.

Acute Angles and Quarter-Turn Rotations

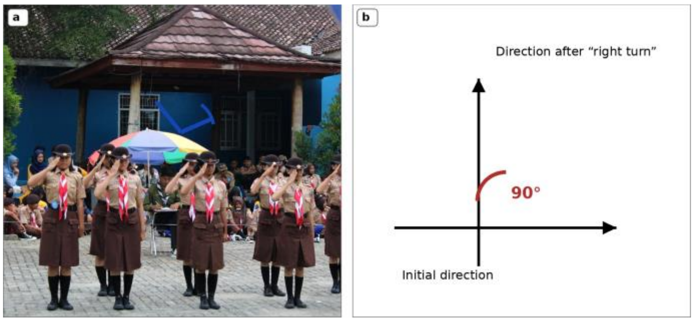

Figure 2. (a) A salute approximating an acute angle; **(b)** a 90° change-of-direction model for a right turn.
Source: Research documentation, 2025; angle and rotation models prepared by the authors.

During the salute, the forearm and the direction of the torso form an opening that visually appears to be less than 90°. This relationship can be classified as an approximation of an acute angle, defined as an angle greater than 0° and less than 90°. Its magnitude should not be inferred solely from visual appearance because camera perspective may distort the image. Learning activities should therefore involve measurement based on three points: the shoulder or elbow as the vertex and two additional points on the arm to define the rays.

A right or left turn produces a quarter-turn change in orientation. Mathematically, the movement can be modeled as a 90° rotation about the body's point of support. The initial and final directions are perpendicular. Describing the movement as a transformation is more precise than merely labeling it a "right angle," because the phenomenon involves a change in position. Teachers can connect the movement to rotation in the coordinate plane, for example, transforming (x, y) into (y, -x) for a 90° clockwise rotation about the origin.

The distinctive feature of this finding is the relationship between geometry and sequential action. The angle formed during a salute is a configuration of body segments, whereas a right or left turn is a transformation from an initial orientation to a final orientation. This dynamic dimension is consistent with Naja et al. (2021), who found that dance movements can represent geometric concepts through changes in body position. In Scouting, changes in orientation are additionally governed by commands and group synchrony.

A learning activity may begin with anticipation: students estimate the arm angle or direction of rotation before moving. During the action phase, groups perform and record the movement and then measure the angle. During reflection, students compare their results with mathematical definitions and explain the sources of discrepancy. This sequence follows the anticipation-action-reflection cycle (OECD, 2019) and helps students recognize that mathematical models are constructed from evidence rather than from visual resemblance alone.

Rectangular Formations and Spatial Relationships

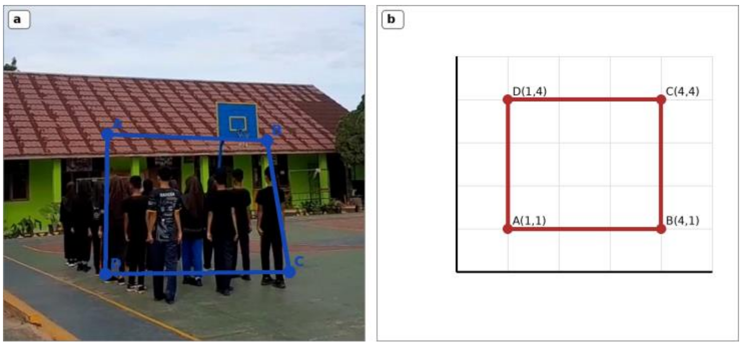

Figure 3. (a) A row-and-column formation approximating a rectangle**; (b)** a coordinate model for testing its properties.
Source: Research documentation, 2025; coordinate model prepared by the authors.

Several rows and columns arranged at relatively uniform intervals create a visual boundary that approximates a rectangle. In an ideal model, opposite sides are parallel and equal in length, all four angles are right angles, and the diagonals are equal. Actual formations may deviate from this model because of differences in step length, camera perspective, the surface of the field, or inaccurate positioning. Such deviations are not weaknesses in the data; instead, they provide opportunities to teach the distinction between a real object and its mathematical model.

Students can assign coordinates to the four vertices of a formation, for example A(1, 1), B(4, 1), C(4, 4), and D(1, 4). They can then use the distance formula to test side lengths, examine parallelism through slope, verify perpendicularity, and calculate perimeter and area. The coordinates of the actual positions can subsequently be compared with the ideal coordinates to quantify deviation. This activity moves geometry beyond identification toward argumentation and model validation.

A rectangular formation also carries social meaning. No participant can create the formation alone. The stability of rows and columns depends on the ability to read the positions of others, adjust spacing, maintain direction, and respond to commands. This meaning is consistent with cooperation in righteousness as expressed in Qur'an, al-Ma'idah [5]: 2. Individual accuracy becomes meaningful when it supports collective order. Mathematics learning can therefore connect spatial precision with social responsibility.

For teachers, a practical implication is to use real data as the basis for discussion. Groups can compare which formation most closely approximates a rectangle, establish criteria for accuracy, and propose a correction strategy requiring the minimum displacement of participants. The Scout leader ensures that movements comply with established procedures, whereas the mathematics teacher guides abstraction, measurement, proof, and reflection. This collaboration prevents the cultural practice from being reduced to a merely decorative image.

Translating the Findings into Deep Learning

Ethnomathematical findings acquire pedagogical value only when they are transformed into structured learning experiences. Deep Learning does not occur simply because students find the Scouting context engaging. Learners need to understand the objective, activate prior knowledge, perform an action, collect evidence, construct representations, evaluate accuracy, and transfer concepts to other situations. The understanding phase may involve observation and conjecture; the application phase may involve movement, measurement, or modeling; and the reflection phase may involve evaluating strategies and refining models (Kementerian Pendidikan Dasar dan Menengah Republik Indonesia, 2025).

Table 2. Movement-based learning activities within the Deep Learning framework

Movement and concept	Concrete learning activity	Deep Learning principle and value
Attention stance - vertical line/inclination	Add a reference line to a photograph, measure deviation from the body axis, and explain the limits of the model.	Mindful; discipline and responsibility.
Right-dress/row alignment - horizontal and parallel lines, distance	Assign position coordinates, compare y-coordinates, and calculate distances between participants.	Meaningful; precision and mutual adjustment.
Salute - acute angle	Identify three points defining the angle, measure its magnitude, and compare results across groups.	Mindful and joyful; respect.
Right/left turn - 90° rotation	Model the initial and final directions on a coordinate plane and apply the quarter-turn rotation rule.	Meaningful; adherence to rules and consistency.
Row-and-column formation - rectangle	Record the coordinates of the vertices, test the properties of the figure, and correct positional deviations with minimum displacement.	Collaborative and reflective; cooperation and solidarity.

Meaningful learning emerges when lines, angles, rotations, and rectangles are connected to experiences already familiar to students. Mindful learning occurs when students understand why they are measuring, select appropriate tools, examine sources of error, and explain the quality of their model. Joyful learning is not synonymous with entertainment; it refers to a positive environment in which students feel safe, respected, appropriately challenged, and capable of completing a task together. These principles are consistent with learning that emphasizes engagement, collaboration, feedback, and knowledge transfer (Fullan et al., 2018; Hattie, 2023; Wulantika, et all., 2026; Nanda, et all., 2026; Aryaningtyas, et. All., 2026).

Teachers may use simple resources such as measuring tapes, ropes, field chalk, protractors, smartphone cameras, coordinate grids, or GeoGebra. Digital technology does not replace physical experience; rather, it helps students visualize rotations, measure angles, compare models, and present mathematical arguments. The cultural context remains central, while digital tools clarify the mathematical relationships.

Integration of Islamic Values, Contributions, and Limitations

Islamic values in this study are situated in the observable meanings of action. Order is reflected in the willingness to maintain position and follow rules; responsibility is evident in efforts to correct a movement; cooperation occurs when participants adjust to one another; and solidarity emerges when individual accuracy strengthens the formation. The Qur'anic verse concerning a firmly joined rank is used as an ethical lens for reflecting on order, not as evidence that a geometric form automatically possesses religious value. This approach keeps the integration of religion contextual, critical, and substantive rather than decorative.

The theoretical contribution of this study is the extension of Scout ethnomathematics from constructive artefacts to dynamic motor practices. Its methodological contribution is a movement-concept-value-learning analytical chain: a movement is documented, represented mathematically, interpreted in relation to the values governing its performance, and translated into a learning activity. Its practical contribution is an example of collaboration between mathematics teachers and Scout leaders in contextual geometry instruction.

This study has several limitations. It was conducted in a single school context and did not test changes in conceptual understanding after the activities were implemented in the classroom. Angle measurements and formation shapes were affected by camera perspective and natural bodily variation. Because the source manuscript did not include verbatim interview transcripts, the discussion relied on paraphrases triangulated with observations and documentation. Future research should develop worksheets or digital modules, conduct experimental or design-and-development studies, investigate more complex transformations and rhythmic patterns, and involve multiple schools or Scout groups.

CONCLUSION

Scout marching drills represent ethnomathematical concepts that can be analyzed specifically: the attention stance models a vertical axis; right-dress alignment and row formation model horizontal lines, parallelism, and distance; the salute approximates an acute angle; right and left turns represent a quarter-turn or 90° rotation; and row-and-column arrangements form a rectangular model that can be tested through coordinates, slope, distance, perimeter, area, and diagonals. The novelty of the study lies in shifting attention from static tents and pioneering structures to dynamic bodily movement while integrating geometry, Deep Learning, and Islamic values. Mathematics teachers and Scout leaders can apply the findings through activities involving observation, movement, measurement, modeling, validation, and reflection in meaningful, mindful, and joyful learning environments. The values of order, responsibility, cooperation, and solidarity can be reflected upon alongside mathematical reasoning. Future studies should develop instructional materials, test their classroom implementation, investigate geometric transformations and rhythmic patterns, and involve a wider range of schools.

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REFERENCES

Ardiyanti, B., Choirudin, C., & Ningsih, E. F. (2024). Etnomatematika bangunan pionering Pramuka terhadap minat dan kreativitas siswa. Jurnal Penelitian Tindakan Kelas, 1(3), 168–173. https://doi.org/10.61650/jptk.v1i3.509

Aryaningtyas, U., Safitri, W., Amelia, N.F., Aulia, R., Fatimah, S. 2026. Analysis of Mathematical Concepts in Cowongan Rituals: An Ethnomathematics Study of the Soka Village Community in Batang Regency. *Ar-Riyadhiyyat: Jurnal Pendidikan Matematika, Vol.6 No.2 Januari 2026.* https://doi.org/10.47766/arriyadhiyyat.v6i2.6928

Bishop, A. J. (1988). Mathematical enculturation: A cultural perspective on mathematics education. Kluwer Academic Publishers.

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

Fatmawaty. (2024). Deep learning: Sebuah pendekatan untuk pembelajaran bermakna. Harmoni Pendidikan: Jurnal Ilmu Pendidikan, 1(1), 71–85. https://doi.org/10.62383/hardik.v1i1.2121

Fullan, M., Quinn, J., & McEachen, J. (2018). Deep learning: Engage the world change the world. Corwin.

Hattie, J. (2023). Visible learning: The sequel: A synthesis of over 2,100 meta-analyses relating to achievement. Routledge.

Hidayatulloh, H. (2024). Eksplorasi etnomatematika pada tenda Pramuka. Jurnal Pendidikan Tambusai, 8(2), 31544–31550.

Hidayatulloh, H., & Suminto, S. (2024). Analisis etnomatematika pada konstruksi gapura pionering ekstrakurikuler Pramuka. Jurnal e-DuMath, 10(2), 142–151. https://doi.org/10.52657/je.v10i2.2455

Kementerian Agama Republik Indonesia. (2019). Al-Qur'an dan terjemahannya: Edisi penyempurnaan. Lajnah Pentashihan Mushaf Al-Qur'an.

Kementerian Pendidikan Dasar dan Menengah Republik Indonesia. (2025). Naskah akademik pembelajaran mendalam: Pendidikan bermutu untuk semua. Kementerian Pendidikan Dasar dan Menengah.

Khasanah, U., Alanur, S. N., Trisnawati, S. N. I., Isma, A., Agustina, E., Dewantara, H., et al. (2025). Deep learning dalam pendidikan: Pendekatan pembelajaran bermakna, sadar, dan menyenangkan. Tahta Media Group.

Lubis, S. I., Mujib, A., & Siregar, H. (2018). Eksplorasi etnomatematika pada alat musik Gordang Sambilan. Edumatika: Jurnal Riset Pendidikan Matematika, 1(2), 1–10. https://doi.org/10.32939/ejrpm.v1i2.246

Majid, A. A., Mariana, N., & Fitri, R. (2025). Analisis pengalaman belajar meaningful learning melalui transformasi matematika tauhid. Cetta: Jurnal Ilmu Pendidikan, 8(3), 357–370. https://doi.org/10.37329/cetta.v8i3.4319

Miles, M. B., Huberman, A. M., & Saldaña, J. (2014). Qualitative data analysis: A methods sourcebook (3rd ed.). SAGE Publications.

Naja, F. Y., Mei, A., & Sa'o, S. (2021). Eksplorasi konsep etnomatematika pada gerak tari tradisional Suku Lio. AKSIOMA: Jurnal Program Studi Pendidikan Matematika, 10(3), 1836–1846. https://doi.org/10.24127/ajpm.v10i3.3885

Nanda, M. A., Luthfany, Z. A., and Putri, R.D.P. 2026. Implementation of Ethnomathematics in Teaching Geometry Concepts in Elementary School: Systematic Literature Review. *Ar-Riyadhiyyat: Jurnal Pendidikan Matematika, Vol.6 No.2 Januari 2026.* https://doi.org/10.47766/arriyadhiyyat.v6i2.6874

OECD. (2018). The future of education and skills: Education 2030. OECD Publishing. https://doi.org/10.1787/54ac7020-en

OECD. (2019). OECD future of education and skills 2030: Anticipation-action-reflection cycle for 2030. OECD Education Policy Perspectives, 105. https://doi.org/10.1787/39105d40-en

Prahmana, R. C. I., & D'Ambrosio, U. (2020). Learning geometry and values from patterns: Ethnomathematics on the batik patterns of Yogyakarta, Indonesia. Journal on Mathematics Education, 11(3), 439–456. https://doi.org/10.22342/jme.11.3.12949.439-456

Risdiyanti, I., & Prahmana, R. C. I. (2018). Ethnomathematics: Exploration in Javanese culture. Journal of Physics: Conference Series, 943, 012032. https://doi.org/10.1088/1742-6596/943/1/012032

Risdiyanti, I., & Prahmana, R. C. I. (2021). Ethnomathematics of wayang and its use in learning set concepts. Journal on Mathematics Education, 12(1), 121–138.

Rismawati, R., & Istiyati, M. (2025). Pendampingan ekstrakurikuler Pramuka dalam peningkatan kedisiplinan dan kerja sama melalui materi dasar Peraturan Baris-Berbaris tingkat Siaga di SDIT Al-Qonita. ASPIRASI: Publikasi Hasil Pengabdian dan Kegiatan Masyarakat, 3(5), 168–176. https://doi.org/10.61132/aspirasi.v3i5.2258

Rosa, M., & Orey, D. C. (2011). Ethnomathematics: The cultural aspects of mathematics. Revista Latinoamericana de Etnomatemática, 4(2), 32–54.

Soebagyo, J., & Noer, A. (2023). Eksplorasi etnomatematika pada bangunan gapura Pramuka. Euclid, 10(2), 268–280. https://doi.org/10.33603/e.v10i2.8552

Ulum, B. (2018). Etnomatematika Pasuruan: Eksplorasi geometri untuk sekolah dasar pada motif batik Pasedahan Suropati. Jurnal Review Pendidikan Dasar, 4(2), 686–696. https://doi.org/10.26740/jrpd.v4n2.p686-696

Wulandari, D. U., Mariana, N., Wiryanto, W., & Amien, M. S. (2024). Integration of ethnomathematics teaching materials in mathematics learning in elementary school. IJORER: International Journal of Recent Educational Research, 5(1), 204–218. https://doi.org/10.46245/ijorer.v5i1.542

Wulantika, Dhea and Sumin. 2026. Systematic Literature Review: Ethnomathematics Research Trends Using Bibliometrix R Studio Biblioshiny (2005-2025). *Ar-Riyadhiyyat: Jurnal Pendidikan Matematika, Vol.6 No.2 Januari 2026.* https://doi.org/10.47766/arriyadhiyyat.v6i2.6544