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ETHNOMATHEMATICS IN BANYUWANGI CULTURE FOR MATHEMATICS EDUCATION: EVIDENCE FROM A SYSTEMATIC LITERATURE REVIEW

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Abstract

This study aims to examine the potential of Banyuwangi culture as a resource for mat matics learning through a Systematic Literature Review (SLR) approach. The review was conducted following the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) protocol to ensure a systematic and transparent literature selection process. Literature searches were carried out in the Google Scholar and Garuda databases for publications published between 2020 and 2025 using keywords related to *ethnomathematics*, *Banyuwangi culture*, and *mathematics learning*. The inclusion criteria consisted of articles discussing elements of Banyuwangi culture containing mathematical concepts or their implementation in mathematics learning, while publications that were not relevant to the research context or were not available in full text were excluded. The selection process included identification, screening of titles and abstracts, full-text eligibility assessment, and quality appraisal of the studies. Based on this process, 13 articles met the criteria and were included in the analysis. The synthesis results indicate that various elements of Banyuwangi culture, such as Osing batik motifs, traditional dances, traditional house architecture, weaving crafts, and community traditions, contain mathematical concepts including geometry, symmetry, similarity, number patterns, and measurement. The integration of these cultural elements in mathematics learning contributes to improvements in cognitive learning outcomes, numeracy and literacy skills, learning motivation, and students' character development, each measured using different instruments. These findings indicate that Banyuwangi culture has strong potential as a contextual and culturally responsive resource for mathematics learning.

Keywords: Ethnomathematics; Banyuwangi Culture; Learning Resources; Systematic Literature Review; Mathematics Learning

INTRODUCTION

Mathematics is one of the lessons that have role significant in the world of education (Legista *et al.*, 2023). Mathematics play a role in develop ability think logical, critical, and systematic in participants educate. However, in practice learning, mathematics often considered as eye abstract and difficult lessons understood Because presentation tend let go from context life everyday. Opinion This reinforced by the way teaching less interesting and not in accordance with context life students, so that make student feel bored and difficult understand material (Pratiwi et al., 2022). Conditions This can cause low motivation Study as well as difficulty student in understand draft mathematics in a way deep. Therefore that, is necessary approach capable learning connect draft mathematics with experience real students so that learning become more meaningful and contextual.

One of approaches that can used is *ethnomathematics* research Turmuzi *et al.* (2023) find that ethnomathematics in Indonesia is developing rapidly since 2016 and played a role important in make learning mathematics more contextual, especially through exploration culture such as batik, houses customs and games traditional. According to D'Ambrosio (1985), *ethnomathematics* is approach that studies

connection between mathematics and culture community. Research Pradhan (2023) show that the teacher understands ethnomathematics with Good can create atmosphere friendly learning cultural and meaningful, because linking experience as well as values local student in the learning process mathematics. Batiibwe (2024) also stated that activity culture like game traditional, dance, and technique weaving contain draft mathematics like patterns, symmetry, and comparison. Concepts the Can used as material relevant learning with context everyday, so that help build ability think analytical and creative students. With ethnomathematics, mathematics No only used in context official like learning or study scientific, but also in various activity culture like arts, crafts, buildings, games, rituals, and product culture other (Tuzaman & Mulyatna, 2024).

In addition, Sunzuma & Umbara (2025) emphasize that in the middle changes in the revolutionary era industry 4.0, combining ethnomathematics with digital technology, such as e- modules and interactive media based on culture, capable increase desire knowledge and understanding student to mathematics in Indonesia. From the perspective view skills 21st century approach ethnomathematics is also capable fertilize ability think creative mathematically, because push student look for various solution based on context culture and experience they (Suherman & Vidákovich, 2022). With Thus, learning based ethnomathematics no only connect mathematics with culture local, but also improve creativity, flexibility think, and ability finish problem student.

Indonesia has diversity a very rich and potential culture become source learning mathematics, one of them is the growing culture of Banyuwangi in public Osing. Osing Tribe is resident original and parts from Javanese ethnic group living in Banyuwangi Regency, East Java (Khofifah *et al.*, 2018). They is descendants from the Blambangan Kingdom, which is one of the branch from the Majapahit Kingdom. They use Language Osing, which is version from Old Javanese language. Various element Banyuwangi culture, such as traditional dance, batik motifs, architecture House customs, crafts weaving, tradition society, as well as food traditional, containing various draft mathematics like geometry, symmetry, pattern numbers, similarity, and measurement. Potential This make Banyuwangi culture is relevant For utilized as context in learning more mathematics contextual and meaningful.

As example namely the Gandrung and Seblang dances. The dances are not only convey message cultural and social, but also has element hidden mathematics in form pattern dance. Dance patterns this show arrangement movement dancer on top stage (Allah *et al.*, 2025). Traditional dance movements that are usually follow pattern certain can analyzed with method abstraction, which refers to the concept mathematics like draft rotation, angle, and pattern repetitive (Wulandari & Sugiarto, 2022). Meanwhile, the Gajah Oling batik motif describe draft transformation geometry (Pratiwi et al., 2022). Architecture House customs Osing display principle similarity, symmetry, and reflected proportion in design building traditional (Hariastuti et al., 2022).

From the description said, the author interested study potential Banyuwangi culture, in particular culture public Osing, as source Study in learning mathematics through approach ethnomathematics. This research novelty in serve mapping comprehensive about relatedness between Banyuwangi culture and concepts mathematics through Systematic Literature Review (SLR) approach. Different with study previously generally only examine One object culture or one context learning certain research. This integrate various results study related ethnomathematics in Banyuwangi culture in general systematically. Through analysis to various source literature, this research not only identify elements culture that contains draft mathematics, but also mapping type draft emerging mathematics as well as form its implementation in learning in various level education. With thus, research This expected can give a clearer picture comprehensive about potential Banyuwangi culture as source learning mathematics at a time become reference for development learning based contextual and grounded

ethnomathematics wisdom local.

METHOD

Research methods used is method *Systematic Literature Review* (SLR) or review literature systematic. *Systematic Literature Review* (SLR) is method research used for collect, evaluate, and integrate various relevant research to something topic certain in a way systematic (Lusiana & Suyani, 2014). The purpose of SLR is for identify, evaluate, and interpret all available research about something question or phenomenon with approach based evidence. Therefore that *Systematic Literature Review* (SLR) was selected Because capable give description comprehensive about potential Banyuwangi culture as source Study mathematics through steps that is formulate questions research, then the process of collection, selection and analysis is carried out various relevant literature.

Findings about potential ethnomathematics in Banyuwangi culture as source learning mathematics become important For reviewed in context education 21st century which emphasizes learning contextual and meaningful. Ethnomathematics allows student learn draft mathematics through practice culture, traditions, and artifacts local nearby with life they, so that help reduce characteristic abstract mathematics as well as increase understanding concept and appreciation to culture area. Various element Banyuwangi culture, such as batik motifs, traditional dances, crafts woven, as well as architecture House custom, known contain concepts mathematics like geometry, symmetry, patterns, and measurement. However, various research that examines ethnomathematics in Banyuwangi culture still spread over objects culture certain and not yet summarized in a way systematic. Therefore that, method *Systematic Literature Review* (SLR) is used Because give comprehensive and transparent approach in summarize proof scientific that has published. Through method this, various results study related ethnomathematics in Banyuwangi culture can analyzed in a way systematic so that produce a clearer picture comprehensive about potential culture local as source learning mathematics.

For ensure implementation systematic and transparent research, research This done with refers to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework. Guidelines This give clear structure and flow in the process of identifying, selecting and evaluating relevant literature. Procedure study implemented through four stages main in accordance with PRISMA flow.

Identification

At the stage identification, researcher do search literature through several scientific databases. Data sources in study This is article scientific, proceedings, and books. The literature used obtained from various online databases such as Google Scholar and POP (Publish or Perish). Search results beginning There are 200 data sources from Google Scholar and POP (Publish or Perish). Data search time includes publication from 2020 to 2025 so that we can covers results study latest. Articles used as reference chosen in accordance with criteria certain. With use related keywords with "Banyuwangi Culture as Source Study Mathematics". Stage This aim For gather various publication relevant scientific with topic research. All relevant articles with topic study the Then collected for analysis more carry on.

Screening

Screening stage is carried out with filter literature based on title and abstract For identify suitability beginning with focus research. Articles that are not relevant with topic ethnomathematics or No related with Banyuwangi culture was eliminated at this stage this. The results of the screening generate 50 data sources that are considered relevant and 150 data sources excluded Because No fulfil criteria beginning.

Eligibility

Next, at the eligibility stage, articles that have passed the screening process beginning analyzed in a way more deep through reading text complete For evaluate its suitability with criteria inclusion and exclusion that have been determined. At this stage This remove duplicates and exceptions

articles that are not in accordance with focus research, so that remaining 23 data sources. Next, after evaluation eligibility in a way comprehensively, only 13 data sources comply criteria. While 10 other data sources excluded Because no fulfil condition.

Inclusion

Stage final is inclusion**,** namely election end articles that meet the requirements all over criteria study for analyzed more continued. Articles included in this stage. Then used as source main in the process of analyzing and synthesizing research data. Researchers investigate in a way deep content from every literature for identify connection between Banyuwangi culture with various draft mathematics. Findings from various source then collected and made into one discussion in article for know potential Banyuwangi culture as source study mathematics.

RESEARCH RESULTS AND DISCUSSION

The research findings in this literature review represent an analysis and summary of 13 articles related to Banyuwangi culture as a resource for mathematics learning. The following analysis focuses on Banyuwangi culture, presented in Table 1.

Table 1. Summary of Research Results on Banyuwangi Culture as a Source for Learning Mathematics.

Researchs (Year)	Title of Article/Proceedings/Book	Research Result
(Agustina et al., 2025)	Ethnomathematics Exploration of Genjah Dance Movements Gumiwang, a creation of the Damar Art Banyuwangi Arts Community	This study investigates the basic movements and patterns in the traditional Genjah Gumiwang dance in Banyuwangi and identifies various mathematical concepts, such as lines, angles, reflections, and plane shapes. The dance floor patterns are applied to depict geometric shapes that can be integrated into elementary school mathematics instruction. The authors emphasize that local culture can be a source of contextual learning that facilitates students' understanding of abstract concepts and fosters a sense of pride in Banyuwangi's cultural heritage.
(Fitriyah & Wardani, 2022)	Analysis of the Needs for Developing LKPD Based on Local Wisdom of the Banyuwangi Region in Elementary Schools	This article discusses teachers' needs for student worksheets (LKPD) that highlight Banyuwangi's local wisdom. The results show that there is a wealth of cultural potential, including dances, Blambangan batik patterns, gamelan musical instruments, and traditional house architecture, which incorporate elements of geometry, patterning, and comparison. This development aims to provide students with knowledge of culture and values that can be implemented in their environment, as well as foster positive values and a love for local culture.
(Astutik, 2020)	Scaffolding in Mathematics Learning Based on the Wisdom of Osing Banyuwangi Culture to	This study analyzes the implementation of Osing culture-based scaffolding among junior high school students. Local cultural elements such as house designs,

	Improve Students' Mathematical Representation	handicrafts, and batik patterns are used as contexts for problems in learning about the surface area of flat shapes. The research findings indicate a significant improvement in students' ability to represent mathematics, both in drawing, writing, and interpreting symbols. Furthermore, culturally focused learning increases student engagement, collaboration, and self-confidence because they learn through contexts relevant to everyday life.
(Masruroh et al., 2023)	Introducing the Concept of Ethnomathematics Through Banyuwangi Local Cultural Exploration Activities	This classroom action research at the early childhood education (PAUD) level implemented exploratory activities rooted in Banyuwangi's local culture (such as traditional games, musical instruments, and traditional house types) to introduce the concept of numbers and basic geometric shapes. The results showed an increase in learning completion from 35% in the pre-cycle to 82% in the second cycle. Children became more energetic, confident, and enthusiastic about learning. The ethnomathematics approach also contributed to instilling character values such as collaboration, responsibility, and a love of culture.
(Nurina & Indrawati, 2021)	Exploration of Ethnomathematics in the Malang Mask Dance as a Learning Resource for Elementary School Mathematics	This article presents a study of the Malangan Mask dance, revealing ethnomathematics through its movements. The mathematical elements found are angles (right, obtuse, acute, straight) and lines (parallel, overlapping, intersecting), which are generated by the dancers' hand and foot positions. This ethnomathematics investigation is recommended as a learning resource (such as a handout) to connect the 2013 Curriculum material, thereby helping students better understand mathematics.
(Hariastuti et al., 2022)	Ethnomathematics of Banyuwangi Culture	This book discusses various aspects of Banyuwangi culture, such as the Using House, the Gandrung Dance, and the Patheng Dudu game, which are rich in mathematical concepts, particularly geometry, patterns, similarity, and transformation. Researchers suggest that local culture can be a relevant and contextual learning resource for students. Integrating Osing cultural elements into mathematics learning can facilitate students' understanding of abstract

		concepts through real-life experiences and foster a sense of pride in local culture.
(Ismiasih & Hermanto, 2025)	Ethnomathematics in Learning Mathematics in High School	This study emphasizes the use of Using batik motifs and the architecture of Osing traditional houses in the learning process of geometric transformation. Teachers and students engaged in hands-on classroom practice. The results showed that students more easily understood the concepts of symmetry and translation and were more engaged in the learning process. Furthermore, the application of ethnomathematics strengthened character values such as patriotism and respect for local cultural heritage.
(Asnawi et al., 2025)	Ethnomathematic Exploration of Geometry Concepts in Traditional Banyuwangi Cakes	This research explores traditional cakes such as Bagiak, Klemben, Kucur, and Pia Glenmore as a tool for learning geometry. The design and preparation of these cakes involve concepts of spatial geometry, volume measurement, and fractions. Their implementation in the classroom supports elementary school students in understanding geometric concepts through familiar and engaging activities. This method also increases students' curiosity and motivation to learn because the learning process becomes more relevant to their daily lives.
(Hotima & Hariastuti, 2021)	Ketupat from Alasmalang Village, Banyuwangi: Exploring Mathematics in Culture	This study explores the unique ketupat weaving of Alasmalang, reflecting the concepts of spatial geometry, patterns, and symmetry. The research findings indicate that ketupat serves as a teaching tool to introduce three-dimensional geometry concepts at the elementary school level. In addition to facilitating students' understanding of spatial geometry, ketupat-making also fosters precision, patience, and the value of cooperation. Teachers are considered capable of utilizing this cultural medium to develop positive character through mathematics learning.
(Hariastuti & Nurmahmudy, 2022)	Besek Papring: Local Wisdom as an Alternative Media Mathematics Learning	This research shows that woven bamboo (besek papring) has a repeating pattern that can be used to teach number operations, particularly multiplication and division. Students are encouraged to analyze the knitting pattern and count the number of knots or bamboo sections. Besek-based learning encourages students to think

		systematically and connect arithmetic concepts to traditional activities. This approach is considered successful in enhancing conceptual understanding and appreciation for the local community's work culture.
(Jannah & Yohanes, 2022)	Ethnomathematics of the Endhog-Endhogan Tradition in Macanputih Village, Kabat District, Banyuwangi	This article explores the mathematical values of the Endhog-Endhogan tradition, such as the egg-laying patterns, the procession sequence, and the decorative shapes that can be linked to the concepts of symmetry and repetition. Through observations and interviews, researchers identified that this tradition can be a learning resource that combines mathematics and religious values. Implementing activities based on this regional tradition fosters a sense of responsibility, cooperation, and pride in students' local wisdom.
(Nada et al., 2024)	Ethnomathematics in Roster Making in Banyuwangi Regency	Researchers examined the design of rosters (ventilation holes in traditional buildings) in Banyuwangi, which feature various geometric patterns. The rosters serve as concrete examples to teach the concepts of symmetry, proportion, and similarity. Students can directly observe the roster's shape and proportions, making the learning process more contextual. This study highlights the significance of using cultural objects as a bridge between abstract mathematical concepts and everyday life.
(Putri & Basir, 2025)	Design of a Similarity Module Based on Problem Based Learning with Ethnomathematics of the Osing House in Banyuwangi to Improve Students' Numeracy Literacy	This research resulted in a learning module on similarity based on Osing House architecture using the Problem-Based Learning (PBL) model. Expert validation demonstrated that this module is highly appropriate and practical for implementation in junior high schools. Limited trials demonstrated improved numeracy literacy skills and understanding of similarity concepts in students. Furthermore, students felt more enthusiastic about learning mathematics because the material was connected to their cultural background.

Thirteen articles featuring Banyuwangi culture as a source for learning mathematics were obtained. Furthermore, each article reviewed was published in journals, proceedings, or books between 2020 and 2025. After analyzing and reviewing these 13 articles, information was obtained to answer the questions discussed in each article.

Table 2. Answers to the Problem Formulation Discussed in the Reviewed Article.

Research (Year)	Banyuwangi Cultural Forms Containing Mathematical Concepts	Implementation in Mathematics Learning	Influence on Student Learning Outcomes and Character
(Agustina et al., 2025)	The Genjah Gumiwang dance contains geometric concepts, such as lines, angles, flat shapes, and reflections which are visible in the floor patterns and dance movements.	The exploration results are used as contextual learning resources for geometry material in elementary schools, helping students understand shapes and angles through visualization of dance movements.	Helps improve understanding of geometric concepts in a concrete way and fosters appreciation and pride in Banyuwangi culture.
(Fitriyah & Wardani, 2022)	Banyuwangi culture such as the Gandrung dance, Blambangan batik, gamelan, and traditional houses have mathematical elements in the form of patterns, symmetry, measurement, and comparison.	Elementary school teachers were analyzed as needing local culture-based LKPD so that mathematics learning is more contextual to regional culture.	The use of culture-based LKPD is expected to increase students' learning motivation, conceptual understanding, and positive attitudes towards mathematics and local culture.
(Astutik, 2020)	Osing culture (traditional houses, crafts, batik motifs, and musical instruments) contains the concept of surface area and flat shapes.	Junior high school learning applies Osing culture-based scaffolding to help students understand the concept of surface area of flat shapes.	Students' mathematical representation abilities increased significantly, accompanied by increased activity, cooperation, and curiosity in learning.
(Masruroh et al., 2023)	Local cultures such as traditional games, traditional house shapes, and musical instruments contain the concepts of numbers, shapes, and patterns.	In PAUD, learning is done through exploration of local cultural objects and activities to introduce basic mathematical concepts.	Learning completion increased from 35% to 82%. Children were more active, confident, and demonstrated characteristics of cooperation, responsibility, and a love of culture.
(Nurina & Indrawati, 2021)	While focused on Malang culture, this	Used as a model for developing exploratory	Provides a systematic analytical framework

	research serves as a methodological reference for analyzing Banyuwangi dances such as Gandrung and Jejer. These dances incorporate concepts of symmetry, rotation, and translation.	methods to discover mathematical concepts in Banyuwangi local culture.	for linking cultural elements to mathematical concepts and supports meaningful culture-based learning.
(Hariastuti et al., 2022)	Identifying the Osing Traditional House, Gandrung Dance, and Patheng Dudu game which contain the concepts of geometry, patterns, symmetry, and transformation.	Explains how to utilize cultural objects as a context for ethnomathematics-based mathematics learning in high school.	Helping students understand geometric concepts contextually and fostering a sense of pride in local culture.
(Ismiasih & Hermanto, 2025)	Using Batik and Osing House architecture contain the concepts of folding symmetry, translation, and rotation.	Used to teach geometric transformations in high school through direct observation and culture-based projects.	Improve conceptual understanding, student participation, and foster character values of love for regional culture.
(Asnawi et al., 2025)	Traditional cakes such as Bagiak, Klemben, Kucur, and Pia Glenmore contain geometric shapes, fractions, and volumes.	Applied in elementary school for learning geometric shapes and measurement through activities of making and observing traditional cakes.	Increase interest in learning and the ability to relate mathematical concepts to everyday life.
(Hotima & Hariastuti, 2021)	Diamond weaving contains the concepts of spatial structures, patterns and symmetry.	Used in three-dimensional geometry learning in elementary school through ketupat making activities.	Improve understanding of spatial concepts and develop careful character and cooperation among students.
(Hariastuti & Nurmahmudy, 2022)	Bamboo weaving (besek) contains number patterns and square shapes that represent the concepts of multiplication and division.	Applied in learning number operations in elementary school using woven patterns as concrete aids.	Improve logical thinking skills and understanding of arithmetic operations contextually.
(Jannah & Yohanes, 2022)	The Endhog-Endhogan tradition contains patterns of sequence, symmetrical shapes, and decorative arrangements of eggs.	Can be used to teach the concept of number patterns and symmetry in junior high school.	Developing religious attitudes, responsibility, and pride in students' local culture.
(Nada et al., 2024)	Traditional roster designs feature the	Used as a learning medium for flat shapes	Cultivate creativity and awareness of the

	concepts of symmetry, similarity, and measurement.	in junior high schools through observation activities and redesigning roster patterns.	relationship between architectural art and mathematics.

Based on Table 2, results were obtained regarding Banyuwangi cultural forms that contain mathematical concepts, their implementation in mathematics learning, and their influence on learning outcomes and student character. The following is a description of the information obtained.

What forms of Banyuwangi culture contain mathematical concepts?

Based on a review and analysis of the 13 articles, several forms of Banyuwangi culture were identified that incorporate mathematical concepts. These include: Traditional dances such as the Genjah Gumiwang Dance and the Gandrung Dance, which contain the concepts of lines, angles, reflections, translations, and symmetry in floor patterns and dancer movements; The Osing Batik and Blambangan Batik motifs contain the concepts of patterns, folding symmetry, rotation, and translation which are relevant to geometric transformation material; The architecture of the Osing Traditional House reflects the concepts of similarity, proportion, and comparison of sizes, which can be used as a real context in learning geometry; Traditional crafts and weaving, such as besek papring and ketupat Alasmalang, show square patterns, repetition, and geometric shapes, which are related to number operations and three-dimensional geometry; Local Games and Traditions, such as Patheng Dudu and Endhog-Endhogan, display the concepts of number patterns, sequences, and symmetry of shapes; Traditional Banyuwangi cakes such as Bagiak, Klemben, Kucur, and Pia Glenmore, contain the concepts of volume, fractions, and geometric shapes; The traditional Banyuwangi Roster (ventilation hole) design also reflects symmetry and similarity.

Based on the results of the analysis, various forms of Banyuwangi culture were obtained, showing that this culture has a deep relationship with mathematical concepts, thus confirming the great potential for the application of ethnomathematics in education. Mathematical concepts embedded in Banyuwangi culture, such as Geometry and Transformation, emerge significantly through floor patterns and dance movements, as well as batik motifs and roster designs, which reflect the concepts of lines, angles, symmetry, reflection, rotation, and translation. On the other hand, Arithmetic, Algebra, and Measurement are interwoven into traditional house architecture, handicrafts, regional games/traditions, and traditional cakes, which encompass the concepts of similarity, proportion, comparison, number patterns, volume, and fractions. Overall, Banyuwangi's cultural heritage offers a diverse and rich real-world context for illustrating and teaching nearly all major branches of mathematics.

Implementation of Banyuwangi culture in mathematics learning at various levels of education.

Based on the results of the review and analysis of table 2, the integration of Banyuwangi culture in mathematics learning is carried out through various strategies and levels of education, including:

a. Early Childhood and Elementary School Levels:
   Understanding basic mathematical concepts can be achieved by exploring local culture, such as through games, traditional house architecture, and local musical instruments. This method makes it easier for students to recognize mathematical shapes and patterns directly. At the elementary school level, educators also utilize student worksheets rooted in Banyuwangi culture, featuring local elements such as batik, dance, and traditional houses, to increase student participation in the learning process.
b. Junior High School Level:
   Problem-Based Learning (PBL) is applied in the context of the Osing House

to teach the concepts of similarity and proportion. Furthermore, a scaffolding approach rooted in Osing culture supports students in understanding the surface area of flat shapes within a cultural context.

c. High School Level
Ethnomathematics is implemented through teaching geometric transformations using batik motifs and Osing House designs, which includes direct observation and collaborative projects. The developed books and guides also support teachers in implementing this approach in more meaningful learning activities.

Based on the analysis results, it was found that the integration of Banyuwangi culture in mathematics teaching was implemented comprehensively with various strategies adapted to each level of education, from early childhood education to high school.

At the early childhood and elementary school levels, the emphasis is on understanding basic mathematical concepts such as shapes and patterns through direct exploration through games, architecture, and worksheets based on batik, dance, and traditional houses to increase participation. Meanwhile, at the junior high school level, integration is enhanced with methods such as Problem-Based Learning (PBL) in the context of the Osing House to teach similarity and proportion, and with a scaffolding approach for the concept of surface area. Finally, at the high school level, ethnomathematics is formally implemented through direct observation and projects that use batik motifs and the Osing House to teach geometric transformations, supported by the creation of guidebooks that support more meaningful and contextual learning activities.

The influence of the Banyuwangi culture-based ethnomathematics approach on students' learning outcomes and character.

Analysis of 13 articles shows that the Banyuwangi culture-based ethnomathematics approach has a positive impact on students' learning outcomes, motivation, and character development, including:

a. Improved understanding of mathematical concepts. This is because students more easily grasp abstract concepts such as geometry, similarity, and symmetry because these concepts are presented in concrete forms from local culture.
b. Improving learning outcomes and numeracy literacy. Several studies have shown significant improvements, such as an increase in learning completion from 35% to 82% after implementing culture-based learning.
c. Cultivating positive character. This is influenced by culture-based activities that help foster values of cooperation, responsibility, thoroughness, and a love of local culture.
d. Increased student motivation and engagement. This is because students become more enthusiastic because the learning feels close to their lives.
e. Encourage creativity and reflective thinking. Providing students with culturally-based projects can help stimulate creative and analytical thinking skills, in line with the demands of 21st-century learning.

The synthesis of the literature indicates that the implementation of ethnomathematics influences several aspects of learning, each measured using different instruments. In terms of **cognitive learning outcomes,** the use of local cultural contexts has been shown to improve students' understanding of mathematical concepts, which is generally measured through **learning achievement tests.** Regarding **numeracy and computational literacy skills,** improvements are reflected in **numeracy tests and culture-based problem-solving tasks.** In addition, this approach also affects **students' learning motivation,** which is commonly measured using **questionnaires or psychometric scales**, as well as **character development**, such as cooperation, responsibility, accuracy, and appreciation of local culture, which are typically assessed through **observations or attitude questionnaires.**

Therefore, the integration of Banyuwangi culture into mathematics learning not only enhances students' conceptual understanding but also contributes to the development of **numeracy literacy, learning motivation, and character formation.** Consequently, an ethnomathematics approach based on local culture can serve as an alternative instructional strategy for creating **contextual, meaningful, and culturally responsive mathematics learning** grounded in local wisdom.

CONCLUSION

Based on the findings of a Systematic Literature Review of 13 relevant articles, it was concluded that Banyuwangi culture holds significant potential as a source of contextual and meaningful mathematics learning. Various cultural elements such as the Gandrung dance, Genjah Gumiwang, Osing batik motifs, Osing Traditional House architecture, ketupat and besek papring weaving, the Endhog-Endhogan tradition, to traditional cakes and roster contain mathematical concepts such as geometry, symmetry, similarity, number patterns, and measurement. The application of these cultures in the learning process at various levels of education has been proven to improve students' understanding of mathematical concepts, learning outcomes, creativity, and motivation, as well as foster positive character traits such as collaboration, responsibility, and a love of local culture. Therefore, the ethnomathematics approach rooted in Banyuwangi culture successfully links mathematics learning with everyday experiences and strengthens students' identity and local wisdom values.

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