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THE ROLE OF ETHNOMATHEMATICS IN ENHANCING CONTEXTUAL MATHEMATICS UNDERSTANDING AMONG STUDENTS

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Abstract

Ethnomathematics integrates cultural practices with mathematical concepts, offering a contextualized approach to mathematics education. This literature review explores the role of ethnomathematics in improving students' understanding of contextual mathematics by analyzing previous research on incorporating cultural elements into learning processes. The findings suggest that ethnomathematics enhances student engagement by connecting mathematics to real-life cultural practices, fostering critical thinking, and improving problem-solving skills. This approach helps make abstract mathematical concepts more accessible and meaningful, particularly for students from diverse cultural backgrounds. Moreover, it supports the preservation of cultural heritage while addressing the challenges posed by standardized and globalized education systems.Despite its benefits, implementing ethnomathematics faces challenges, including limited culturally tailored resources, insufficient teacher training, and difficulties in aligning with standardized curricula. Addressing these obstacles requires developing culturally responsive teaching materials and enhancing educators' familiarity with diverse cultural contexts. This review emphasizes the importance of ethnomathematics as an innovative approach to creating inclusive and equitable mathematics education. It also highlights the need for further research and practical applications to maximize its potential in preserving cultural identity and enriching mathematics learning experiences.

Keywords: *Ethnomathematics, Contextual Mathematics, Cultural Practices, Mathematics Education, Inclusive Learning, Student Engagement, Cultural Preservation.*

INTRODUCTION

The contextual approach in mathematics learning is very important because it can help students relate mathematical concepts to their daily lives. Through this approach, students not only learn theory but also understand how to apply mathematics in real-life situations. Contextual learning focuses on students' experiences, where they are expected to discover and build their own knowledge. Research results show that learning using a contextual approach can significantly improve students' understanding of mathematical concepts, compared to traditional teaching methods that are more rote memorization-based (Rohayati, 2005).

In its implementation, the contextual approach encourages the use of strategies such as REACT (Relating, Experiencing, Applying, Cooperating, and Transferring). This strategy helps students connect the subject matter with their life experiences, making learning more relevant and engaging. Research shows that students who learn with this approach are more actively engaged in class and

have higher motivation to learn (Nuha et al., 2024). In addition, contextual learning also enhances students' mathematical communication skills, which is an important aspect of problem-solving (Rahmah, 2021).

Another advantage of the contextual approach is its ability to create a more interactive and collaborative learning environment. Students are encouraged to work together in groups, share ideas, and help each other understand mathematical concepts. This not only enhances their academic competence but also the social skills that are important for everyday life. Thus, the application of a contextual approach in mathematics learning is not only beneficial for students' academic understanding but also for the development of their character and social skills (Putra, 2023).

The role of culture in understanding abstract mathematical concepts is very significant, especially through the approach of ethnomathematics. Ethnomathematics connects mathematical concepts with local culture and practices familiar to students, making learning more relevant and contextual. By linking mathematics with traditions and daily activities, students can more easily visualize concepts that were previously considered abstract, such as fractions or geometry. Research shows that students who learn with this approach have a better understanding of mathematical concepts compared to conventional methods (Septiani, 2024; Setiani et al., 2023).

In addition to enhancing understanding, the integration of culture in mathematics education can also increase student motivation. When students see the application of mathematics in the context of their culture, they feel more connected and interested in learning. For example, using batik patterns to teach geometry or dividing traditional food to explain fractions can create a more engaging and meaningful learning experience (Fajriyah, 2018; Rawani & Fitra, 2022). This aligns with the opinion that mathematics teaching should not only focus on theory but also on how mathematics is applied in everyday life within a specific cultural context.

However, the implementation of ethnomathematics also faces challenges, such as the need for teachers to have a deep understanding of local culture and the selection of appropriate contexts to avoid misunderstandings. Nevertheless, the potential of ethnomathematics as a bridge between abstract concepts and students' real-life experiences is very significant. With this approach, it is hoped that students not only understand mathematics theoretically but also appreciate and apply that knowledge in the context of their daily lives.

The challenges of learning mathematics among students are very diverse and can be categorized into several groups. First, difficulty in understanding concepts is the main challenge faced by students. Many students have difficulty understanding basic mathematical concepts, such as arithmetic operations and problem-solving. Research shows that the lack of guidance and ineffective

teaching methods contribute to this problem, where students often do not receive adequate explanations from teachers (Amanda et al., 2024; Nasution et al., 2023). In addition, many students also have difficulty reading and understanding word problems in mathematics, which results in them being unable to apply the concepts they have learned.

Secondly, the lack of motivation to learn also becomes a significant factor in the challenges of learning mathematics. Students who are not interested or feel anxious about this subject tend to have lower achievements. This anxiety is often caused by the pressure to achieve good results or the fear of failure (Wiryana & Alim, 2023). Research shows that to enhance motivation, it is important for teachers to create a positive learning environment and use innovative and engaging teaching approaches. This can help students feel more engaged and enthusiastic in the learning process.

Third, the challenges of online learning during the COVID-19 pandemic have also changed the dynamics of mathematics education. Many students experienced difficulties in interacting with teachers and classmates, as well as facing technical issues such as unstable internet connections. The lack of clarity in the teacher's explanations during online learning causes many students to feel confused and not understand the concepts well. Therefore, it is important for educators to adapt their teaching methods to better meet the needs of students in this digital era.

The purpose of this research is to review the literature on the application of ethnomathematics in education, particularly in the context of mathematics learning. Ethnomathematics is an approach that links mathematical concepts with local culture and practices, allowing students to understand abstract concepts in a more concrete and relevant way. Research shows that the application of ethnomathematics can enhance students' understanding of various mathematical concepts such as fractions and geometry, as well as increase their learning motivation (Sirate, 2012).

LITERATURE REVIEW

The Concept of Ethnomathematics

Ethnomathematics is a concept that connects mathematics with specific cultural contexts, introduced by Brazilian mathematician Ubiratan D'Ambrosio in 1977. This term originates from three components: "ethno" which refers to cultural groups, "mathema" meaning knowledge or understanding, and "tics" related to technique or method. Thus, ethnomathematics can be defined as the practice of mathematics carried out by specific cultural groups, including tribal communities, worker groups, and children from various social backgrounds (Wahyuni & Pertiwi, 2017).

The ethnomathematics approach focuses on how culture influences the way individuals understand and use mathematics in everyday life. This includes observing the mathematical techniques and strategies used in specific cultural contexts, such as measurement in handicrafts, calculations in traditional agriculture, or the use of patterns in art. By integrating cultural elements into mathematics learning, students can more easily understand abstract concepts because they can see real applications of mathematics in contexts they are familiar with (Sarwoedi et al., 2018).

The application of ethnomathematics in education aims to make mathematics learning more relevant and meaningful for students. By linking the subject matter with students' cultural experiences, it is hoped that their motivation and understanding of mathematics can be enhanced. Research shows that this approach not only enriches the educational curriculum but also helps students develop critical and creative thinking skills through problem-solving related to their cultural context (Aminah et al., 2023).

Contextual Mathematics

The concept of contextual mathematics refers to a learning approach that links mathematical material with real-life contexts experienced by students. This approach aims to help students better understand mathematical concepts through experiences and situations relevant to their daily lives. Thus, learning becomes more meaningful and engaging, as students can see real-life applications of what they are learning.

The relationship between culture and mathematics learning is very close, especially in the context of ethnomathematics. Culture influences the way students understand and use mathematics in their daily lives. Through a contextual approach, teachers can integrate elements of local culture into the mathematics curriculum, allowing students to learn in a way that is more relevant and aligned with their experiences. For example, the use of traditional patterns in art or handicrafts to explain geometric concepts can make learning more engaging and easier to understand (Asyiah et al., 2022). Thus, learning mathematics not only becomes a mere transfer of knowledge but also a way to appreciate and understand the culture around them.

The application of a contextual approach in mathematics learning also encourages students to collaborate and interact with each other, creating an active and enjoyable learning environment. Students are encouraged to work together in groups, share ideas, and discuss problem-solving related to their cultural context. This not only enhances the understanding of mathematical concepts but also the social and communication skills of the students (Sulianto, 2008).

The Relevance of Ethnomathematics and Contextual Mathematics

The relevance of ethnomathematics and contextual mathematics lies in their ability to connect mathematics learning with the cultural context and daily life of students. Ethnomathematics focuses on how mathematical concepts are applied in specific cultural practices, allowing students to see the direct relevance of what they are learning. This approach not only helps students better understand abstract concepts but also increases their motivation and engagement in learning. By integrating elements of local culture into the curriculum, ethnomathematics creates a more meaningful and enjoyable learning experience for students, in line with the principles of contextual learning that emphasize the importance of the relationship between the subject matter and students' real lives (Naja et al., 2022).

Moreover, the application of contextual mathematics based on ethnomathematics can significantly improve students' learning outcomes. Research shows that when students are taught using an approach that combines local culture with mathematical concepts, they tend to be more active in the learning process and have a better understanding of the material. For example, the use of stories or cultural activities in teaching can help students develop mathematical problem-solving skills that are relevant to their context. Thus, the integration of ethnomathematics and contextual mathematics not only enriches the learning experience but also contributes to the development of students' character and social skills (Prastica et al., 2025).

METHOD

The literature review approach is a systematic research method to identify, evaluate, and synthesize various literature sources relevant to a specific topic. This process involves several important steps, including a comprehensive literature search, critical analysis of the identified sources, and the preparation of a report that presents the findings in a structured manner. This method is useful for providing a comprehensive overview of existing research, helping researchers identify gaps in the literature, and building a theoretical foundation for new research (Sugiyono, 2015).

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RESULT AND DISCUSSION

Examples of applying ethnomathematics in learning across various cultural contexts.

The application of ethnomathematics in mathematics education can be seen through the use of relevant local cultural contexts to help students understand mathematical concepts. For example, in teaching fractions, students can be taught through the division of traditional foods known in their area, such as tumpeng rice or lapis cake. In this way, students not only learn about fractions theoretically but also see real applications of the concept within their culture. Additionally, the use of batik patterns or carving motifs in geometry teaching has also proven effective, where students can more easily understand shapes and space through cultural contexts that are familiar to them (Siregar et al., 2024).

The Impact of Ethnomathematics on Students' Understanding of Mathematical Concepts

The impact of applying ethnomathematics on students' understanding of mathematical concepts is very significant. Research shows that students who learn using the ethnomathematics approach have a better understanding of abstract mathematical concepts compared to conventional methods. This is due to the ability of ethnomathematics to bridge the gap between abstract understanding and real-life applications in everyday life. In addition, ethnomathematics also contributes to the enhancement of learning motivation and the development of students' critical and creative thinking skills. By linking mathematics learning with local culture, students become more active and motivated to explore and analyze mathematical concepts in contexts they are familiar with (Serepinah & Nurhasanah, 2023).

Advantages of Using Ethnomathematics

The use of ethnomathematics in mathematics education provides significant benefits in increasing student engagement. By linking mathematical concepts with local culture and traditions, students feel more connected and motivated to actively participate in the learning process. Research shows that this approach not only makes learning more engaging but also helps students understand the material better. For example, the use of batik patterns in teaching geometry allows students to see real applications of mathematics within their cultural context, thereby increasing their interest and motivation to (Lubis et al., 2024; Putri et al., 2024).

In addition, ethnomathematics also helps connect mathematics with students' daily lives. By using examples from cultural contexts familiar to them, students can understand how mathematics is applied in real-life situations. This

approach bridges the gap between abstract understanding and practical application, making it easier for students to internalize mathematical concepts. Research results show that students who learn through ethnomathematics have better problem-solving skills and can apply mathematical knowledge in contexts relevant to their lives (Wicaksono & Prihastari, 2023).

Challenges in the Implementation of Ethnomathematics

One of the main challenges in the implementation of ethnomathematics is the presence of diverse local cultural constraints and the influence of globalization. In Indonesia, each region has unique cultural and mathematical practices, which require a special approach to identify and develop teaching materials that are appropriate to the local cultural context. However, globalization often brings homogeneous educational standards, thereby neglecting important local values in learning. This can create a gap between the national curriculum and local cultural needs, as well as reduce the relevance of ethnomathematics learning for students. Without adequate support to integrate local culture into the curriculum, students may not be able to see the connection between mathematics and their daily lives (Siregar et al., 2024).

The limitation of ethnomathematics-based teaching materials also poses a significant obstacle in the implementation of this approach. Many teachers have difficulty finding or developing materials that are suitable for their local cultural context. Additionally, the lack of training and resources for teachers related to ethnomathematics means they do not have adequate knowledge and skills to integrate this approach into teaching. As a result, although ethnomathematics has great potential to enhance students' understanding of mathematics, challenges in providing relevant teaching materials and training for teachers can hinder its successful implementation in the field.

Future Perspectives of Ethnomathematics

Innovation in ethnomathematics-based learning methods is crucial for enhancing the relevance of mathematics education in the era of globalization. By integrating local cultural values into the curriculum, teachers can create more contextual and engaging learning experiences for students. For example, the use of traditional games like Ma'cciccu in learning can help students understand mathematical concepts in a fun and interactive way. Research shows that this approach not only makes learning more engaging but also enhances students' analytical thinking skills (Diningsih & Asfar, 2024). In addition, this innovation can help students feel more connected to the subject matter, thereby increasing their motivation and learning outcomes (Mursabdo & Widajat, 2021).

Although ethnomathematics shows great potential in education, there is still much room for further research to explore the effectiveness of this approach.

More in-depth research is needed to identify the best strategies for implementing ethnomathematics in various cultural contexts and to understand its impact on students' understanding of mathematical concepts. For example, studies on the implementation of ethnomathematics-based learning modules using technology such as Wingeom have shown positive results in improving students' understanding of spatial structures. By continuing to conduct research and development in this field, it is hoped that ethnomathematics can become an integral part of relevant and effective mathematics education in the future.

CONCLUSION

The role of ethnomathematics in enhancing students' contextual understanding of mathematics is highly significant. This approach connects mathematical concepts with local culture, making it easier for students to see the relevance of mathematics in everyday life. Consequently, ethnomathematics can increase learning interest, critical thinking skills, and a deeper understanding of mathematical concepts. The implications of this approach include transforming mathematics education from being perceived as abstract to being more concrete and meaningful. Teachers can utilize traditions, arts, or local practices as teaching materials, creating a more inclusive and engaging learning environment. This supports the integration of culture into the educational curriculum and has the potential to holistically improve mathematical literacy. However, its limitations lie in cultural diversity, which requires further research to ensure the approach's relevance across various contexts. Additionally, not all teachers have an in-depth understanding of local cultures, emphasizing the need for training and support to optimize the effectiveness of ethnomathematics. Another challenge is adapting cultural materials to fit curriculum standards without diminishing their cultural essence.

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