



SYSTEMATIC LITERATURE REVIEW: CULTURAL INTEGRATION IN LEARNING CONCEPTS WITH AN ETHNOMATHEMATICS APPROACH

Rahmi Hayati¹*, Edi Syahputra², Edy Surya³

¹Universitas Almuslim, Indonesia

^{2,3}Universitas Negeri Medan, Indonesia

*hayatirahmi@yahoo.com

ABSTRACT

In an educational context, the integration of culture in the learning concept is essential to ensure that each student feels recognized and their values are appreciated. The ethnomathematics approach is one way to integrate culture into mathematics learning. By including mathematical examples and problems that are relevant to students' culture, learning will become more meaningful and students will be more motivated to learn. In addition, by understanding mathematical concepts from various cultures, students can develop a deeper understanding of these concepts. It can also help in creating an inclusive learning environment and stimulate students' interest in mathematics. It is important to continue to develop this approach in our educational context to ensure that every student gets a fair and stimulating opportunity to learn mathematics.

Keywords: *Cultural Integration, Learning concept, ethnomathematics*

1. INTRODUCTION

Mathematics education is an important part of every individual's development. However, mathematics learning in schools often tends to ignore cultural aspects, making it difficult for students to relate mathematical concepts to their daily lives (Hendriyanto et al., 2023). One approach that can be used to overcome this problem is the ethnomathematics approach. This approach integrates culture in mathematics learning so that students can see the relevance between mathematical concepts and their culture (Serepinah & Nurhasanah, 2023).

By applying an ethnomathematics approach, mathematics learning can become more interesting and relevant for students. They can see how mathematical concepts do not only come from textbooks but can also be found in everyday life and various aspects of their culture. This can motivate students to study mathematics with more enthusiasm because they can see the immediate use and relevance of what they are learning.

In addition, by integrating culture into mathematics learning, students can also understand that mathematical concepts are not isolated from their cultural context (Ramadhani et al., 2023). They will better understand how mathematics is not only a calculation tool, but also has roots in human culture and history. Thus, mathematics educators need to consider an ethnomathematics approach to teaching to create inclusive, relevant, and motivating learning for all students. By integrating culture into mathematics learning concepts, we can help students develop a deeper understanding and appreciation of how mathematical concepts are used in everyday life and how culture contributes to influencing mathematical understanding.

In addition, cultural integration in mathematics education can also help in maintaining and promoting cultural heritage and stimulate students' interest in learning mathematics (Andriono, 2021). By including examples and applications of mathematics in cultural contexts, students can understand mathematical concepts in a more real and relevant way. In addition, cultural integration in mathematics education can also help students develop a sense of pride in their cultural heritage. This can increase students' motivation to learn mathematics because they feel that learning mathematics is also part of inheriting and maintaining their cultural identity.

Thus, the ethnomathematics approach opens up opportunities for students to realize that mathematics is not only separate from their daily lives and culture but is also an integral part of both aspects. So, as mathematics



educators, it is important to look for ways to integrate cultural aspects in mathematics learning to create more meaningful and relevant learning experiences for students (Verner et al., 2019),

2. METHODS

The method used in this research was a literature review. The literature review was the first and most important step in preparing a research plan. A literature review is a search and research of the literature by reading various books, journals, and other publications related to the research topic, to produce an article regarding a particular topic or issue (Marzali, 2017). The context that was the object of this research was closely elaborated data regarding educational leadership. Next, the process of data collection and analysis was carried out, then the research presented conclusions as a conclusion to the results of this research.

3. RESULTS & DISCUSSION

Ethnomathematics Concepts in Learning

The concept of ethnomathematics in learning includes the use of culture and everyday life as a context for learning mathematics. This approach not only focuses on the application of mathematical concepts in real life but also considers the various mathematical practices that have existed in society since time immemorial. For example, in Javanese culture, there is a practice of mathematical calculations used in traditional carving arts such as batik or wood carving. By studying these mathematical practices, students not only learn mathematical concepts but can also appreciate the richness of traditional culture and art. This not only provides a deeper understanding of mathematics but also opens students' minds to the cultural diversity that exists around them.

Apart from that, the concept of ethnomathematics also allows students to see mathematical concepts in various aspects of everyday life. For example, when learning about patterns and sequences in mathematics, students can identify patterns found in traditional art, music, or dance in their culture. This not only makes learning mathematics more interesting but also helps students to relate mathematical concepts to their own experiences and life contexts. By adopting the concept of ethnomathematics in learning, mathematics learning can be more inclusive and can accommodate students' diverse cultural backgrounds. This creates a more grounded and relevant learning environment for students and helps break down the gap between everyday life and abstract mathematical concepts.

Apart from that, the concept of ethnomathematics can also stimulate students' interest in mathematics, because they can see the relevance and usefulness of mathematics in the context of their lives. When students can identify mathematical concepts in their daily lives, they will be more motivated to learn and understand mathematics in more depth. By presenting mathematics as an integral part of everyday life and culture, an ethnomathematics approach can also help students to develop analytical, problem solving, and critical thinking skills. They can see how mathematical understanding can be used to understand and solve various situations in everyday life, both in cultural contexts and in universal contexts.

Therefore, it is important for mathematics educators to integrate ethnomathematics concepts in learning (Tampubolon et al., 2023). By utilizing mathematical practices in various cultures and everyday life as a learning context, students can gain a more comprehensive understanding of mathematics and how mathematical concepts can be applied in a variety of situations. Apart from that, in applying the concept of ethnomathematics, educators can also broaden students' perspectives on mathematics and culture. Through this approach, students not only learn about mathematical concepts but also develop a sense of pride in their cultural heritage. In this way, learning mathematics is no longer something separate from everyday life, but instead becomes an important part of understanding and preserving cultural riches.

Application of the Ethnomathematics Approach in the Curriculum

It is important to include an ethnomathematics approach in the mathematics curriculum, from elementary to advanced levels. This ensures that students of all levels can experience an inclusive and meaningful learning



experience. In addition, by including cultural aspects in the curriculum, students can develop a broader understanding of mathematical concepts and relate them to everyday life and their cultural heritage (Adam, 2004). Apart from that, implementing an ethnomathematics approach in the curriculum also requires the development of learning materials that support cultural integration. This includes compiling examples and applications of mathematics that are relevant to various cultures, as well as developing learning resources that highlight the contribution of culture to the development of mathematics. In this way, students can see the connection between mathematics and their culture, and develop a sense of pride in their cultural heritage (Lidinillah et al., 2022).

Apart from that, in implementing the ethnomathematics approach, educators also need to make adjustments in teaching and assessment methods. Teaching methods that support an ethnomathematics approach must allow students to use their cultural context to understand mathematical concepts (Rosa & Orey, 2011). Meanwhile, assessments must also consider the application of mathematical concepts in cultural contexts, so that students can demonstrate their understanding comprehensively. Finally, implementing an ethnomathematics approach in the curriculum can also involve collaboration with local communities or certain ethnic groups in developing learning materials (Yandani & Agustika, 2022).

Cultural Influences on Mathematics Teaching

Mathematics teaching that integrates culture can have a significant positive impact on students. First, cultural integration in mathematics teaching can create self-confidence and positive identity in students, especially those from diverse cultural backgrounds. They can see the contribution of their culture in understanding mathematics as valuable and relevant. Apart from that, teaching mathematics that pays attention to culture can also increase student participation in learning. By involving real examples and situations related to students' culture, they can feel more motivated to be actively involved in mathematics learning. It also allows teachers to create more contextual and meaningful learning experiences for students (Mania & Alam, 2021).

The influence of culture in teaching mathematics can also create a stronger relationship between students and the subject matter. When students see that mathematical concepts can be applied in their cultural context, they will be more involved in the learning process and understand the relevance and usefulness of mathematics in everyday life. By implementing mathematics teaching that pays attention to culture, students can also develop an attitude of tolerance and respect for cultural diversity (Christian Ginting et al., 2023). They will better understand that there are various views and approaches to mathematics in various cultures, and appreciate the uniqueness and contribution of each culture in developing mathematical concepts (Wulandari et al., 2024). Thus, teaching mathematics that pays attention to culture not only creates more meaningful learning but also helps students develop a broader understanding of cultural diversity and how mathematics can be a platform that connects various cultural heritages.

The Importance of Supporting Mathematics Teaching that Pays Attention to Culture

Support for culturally attentive mathematics teaching is not only important for individual students but also for building an inclusive and cultural society. Through culturally attentive mathematics teaching, we can help bridge cultural gaps and increase appreciation for diversity in society (Zaenuri et al., 2019). In addition, this approach can also be a strong foundation for introducing mathematical concepts to students from different cultural backgrounds. By engaging mathematical concepts in their cultural context, students can more easily understand and feel connected to the subject matter, thereby increasing their learning success.

Support for mathematics teaching that takes into account culture is also important in efforts to preserve and promote cultural heritage. By integrating culture into mathematics teaching, we help strengthen students' sense of pride in their cultural heritage. This can have a positive impact on the maintenance and development of cultural heritage because students will care more about and understand their cultural values through inclusive mathematics learning (Meaney et al., 2022). In addition, support for mathematics teaching that pays attention to culture also plays a role in preparing students for life in a multicultural society. By understanding the contribution of culture to



mathematics, students will be better prepared to interact and work in a culturally diverse environment. This will help create a society that is more inclusive and tolerant of differences, thus supporting the creation of a harmonious and cultural environment (Fouze & Amit, 2023). Therefore, educators and educational policymakers need to continue to support culturally attentive mathematics teaching. Through the integration of culture in mathematics learning, we not only enhance students' learning experiences but also help prepare them to appreciate and maintain cultural richness in the future.

Culture-Based Mathematics Learning Methods

Several mathematics learning methods can be applied specifically to pay attention to culture in the teaching process. One of them is a contextual approach that allows students to understand mathematical concepts through real situations related to their culture. By providing students with culturally relevant examples and problems, they can see the connection between mathematics and their everyday lives. In addition, this approach can also involve the use of teaching materials that tell the history of mathematics from various cultures. By introducing cultural heritage from a mathematical perspective, students can feel more connected to the subject matter and understand the contribution of culture to the development of mathematical concepts. Furthermore, collaborative learning is also a method that can support mathematics teaching that pays attention to culture (Trisnani & Utami, 2021). Through collaboration between students with different cultural backgrounds, they can share knowledge and experiences in understanding mathematical concepts. This not only increases students' understanding of cultural diversity but also strengthens relationships between students in the learning environment (Muhtadi et al., 2017).

The application of technology in mathematics learning can also be a means of paying attention to culture. By using digital learning resources that integrate cultural context, students can more easily access information and teaching materials that are relevant to their cultural background. Apart from that, technology also allows the development of mathematics applications that can be adapted to various cultures, so that students can learn mathematics more fun and meaningfully (Turmuzi et al., 2024). By paying attention to various culture-based mathematics learning methods, educators can create an inclusive learning environment and support holistic student development. Through teaching mathematics that pays attention to culture, students can gain a deeper understanding of mathematics while developing a sense of pride and appreciation for their cultural heritage.

Strategies for Integrating Culture in Mathematics

Integrating culture in mathematics learning requires appropriate strategies to ensure student engagement and a deep understanding of mathematical concepts in a cultural context. One strategy that can be used is an emphasis on community involvement in mathematics teaching. By involving communities in mathematics learning, students can understand the contribution of their culture in the development of mathematical concepts. For example, inviting local community leaders or cultural figures to share experiences about the application of mathematics in the daily lives of their community. This not only provides students with a more concrete understanding but also strengthens the relationship between school and community and builds students' pride in their cultural heritage. In addition, using teaching materials that incorporate stories or legends from certain cultures can also be an effective strategy (Mania & Alam, 2021). By including cultural narrative elements in mathematics teaching, students can develop a sense of curiosity and interest in their own culture, while understanding mathematical concepts in a context that is more interesting and relevant to them.

An interdisciplinary approach is also a strategy that can improve mathematics teaching that takes into account culture. By integrating cultural elements in mathematics learning, for example, through art, music, or language, students can more easily relate mathematical concepts to their everyday cultural experiences and expressions. Finally, learning that is responsive to cultural diversity is also a key strategy for integrating culture into mathematics. This approach allows educators to respond to the individual needs of students with diverse cultural backgrounds so that each student can feel valued and engaged in mathematics learning. By implementing these



strategies, culturally attentive mathematics teaching not only creates more meaningful learning but also helps create an inclusive learning environment and prepares students to appreciate the cultural diversity around them.

The Role of Ethnomathematics in Multicultural Education

Ethnomathematics plays an important role in preparing students for life in a multicultural society (Wahyudin, 2018). By studying cultural contributions to the realm of mathematics, students can develop a deeper understanding of how mathematics relates to the daily lives of various cultures. This understanding will help them to better understand and appreciate the varying perspectives of mathematics among various cultural groups. Along with that, an ethnomathematics approach can also help improve the academic achievement of students from diverse cultural backgrounds. By applying cultural context in learning mathematics, students can feel more involved and motivated in learning mathematics. Apart from that, ethnomathematics can also bridge learning gaps between students, especially in the context of cultural diversity (Khatri, 2020).

In the context of multicultural education, educators need to understand and apply ethnomathematics concepts in teaching mathematics. This will help create an inclusive learning environment, enrich students' learning experiences, and encourage mutual respect and tolerance for cultural differences (Anderson-Pence, 2015). By integrating ethnomathematics in multicultural education, we not only create more meaningful mathematics learning for students but also help form individuals who can appreciate and understand cultural diversity in a multicultural society.

Building Mathematical Understanding Through Local Culture

One effective way to build mathematical understanding through local culture is to utilize concrete examples and applications of mathematics in everyday life that are relevant to local culture. For example, in teaching geometry, educators can use examples of traditional buildings or decorative patterns commonly found in local culture to strengthen students' understanding of geometric concepts. In addition, considering approaches that are responsive to cultural diversity is also important in building mathematical understanding through local culture (Cahya Sari Putra & Nur Mahmudah, 2021). Educators need to understand the diverse backgrounds of students and ensure that mathematics teaching materials are not only relevant to local culture but also accessible and understandable to all students without exception. By utilizing folklore, traditional games, or daily practices in teaching mathematics, students can see the relevance of mathematical concepts in their daily lives, while fostering a sense of pride in local culture (Efendi & Surya, 2023). This not only improves mathematical understanding, but also strengthens students' identity and love of their culture (Andhany et al., 2023). By utilizing local culture as a context for mathematics learning, students can develop their mathematical skills while experiencing the depth and richness of their culture (Siregar et al., 2023). This approach also allows students to see the value and relevance of mathematics in their daily lives, thereby strengthening learning motivation and understanding of mathematical concepts in the local cultural context (Ramadhani et al., 2023). Thus, building mathematical understanding through local culture is not only about helping students understand mathematical concepts but also about enriching their learning experience by appreciating and celebrating local culture which is an important part of their identity (Cimen, 2014).

Mathematics Learning Innovation with Ethnomathematics

Developing mathematics learning innovations using an ethnomathematics approach can be an important step in creating a more diverse and inclusive learning experience. One innovation that can be implemented is the use of digital technology to explore and embrace diverse mathematical practices in various cultures. By utilizing digital platforms, students can learn traditional mathematical practices from various cultures, such as problem-solving, measurement, or number order, which can enrich their understanding of mathematical concepts (Suherman & Vidákovich, 2022); (Ramadhani et al., 2021). In addition, technology can also be used to facilitate



collaboration between students from different cultural backgrounds in solving mathematical problems related to their cultural heritage (Yolanda Br Tarigan & Syahputra, 2023).

Another innovative approach is to involve local communities in mathematics learning. By inviting local cultural figures or practitioners who use mathematics in everyday life to share their experiences and knowledge, students can see how mathematical concepts are used in real contexts and are relevant to their culture. Apart from that, the development of mathematical games based on folklore or traditional practices is also an interesting innovation. By using folklore or traditional games as a basis, students can learn and understand math concepts in a fun and meaningful way, while remaining connected to their cultural heritage.

Through these innovations, educators can create mathematics learning experiences that are more interesting and relevant to the lives of students from various cultural backgrounds. This not only increases students' learning motivation but also helps create an inclusive learning environment and enriches students' understanding of the contribution of culture to the domain of mathematics. By continuing to enrich the mathematics learning approach with ethnomathematics, we can ensure that every student feels valued and involved in learning mathematics while preparing them to become individuals who appreciate and understand the cultural diversity around them.

Evaluation and Effectiveness of Ethnomathematics in Learning

To evaluate the effectiveness of using ethnomathematics in learning, educators can involve various evaluation methods that are responsive to cultural diversity. One approach that can be used is to involve students in the evaluation process to get a direct view of how ethnomathematics influences their understanding and motivation to learn mathematics (Sulistiyowati et al., 2023). Additionally, the use of case studies and qualitative analysis can also provide in-depth insight into how ethnomathematics influences the academic achievement and engagement of students from various cultural backgrounds. By interviewing students, parents, and educators, we can gain a comprehensive understanding of the impact of ethnomathematics on mathematics learning.

Not only that, the use of quantitative data to monitor the progress of students from various cultural groups is also needed. By comparing test or assessment results between students from different cultural backgrounds, we can evaluate the effectiveness of ethnomathematics in reducing learning gaps and improving mathematics learning for all students. In addition to academic evaluation, it is also important to pay attention to the social and psychological effects of applying ethnomathematics. Monitoring student interactions, attitudes toward mathematics, and self-confidence in learning mathematics from a cultural perspective can provide a more holistic understanding of the effectiveness of ethnomathematics in creating inclusive learning environments.

By integrating various evaluation methods that are responsive to cultural diversity, we can gain a comprehensive understanding of the effectiveness of ethnomathematics in mathematics learning. This will enable educators to continue to develop and adapt ethnomathematics approaches to suit the needs of students from various cultural backgrounds, thereby creating more inclusive and meaningful mathematics learning (Imswatama & Lukman, 2018).

4. CONCLUSION

After explaining the concepts of ethnomathematics and cultural integration in mathematics learning, it can be concluded that this approach provides many significant benefits in learning. Cultural integration in mathematics learning can help students to better understand mathematical concepts in a way that is relevant to their daily lives. This also helps in broadening students' perspectives on mathematics, as well as respecting cultural diversity in the classroom. However, it should be remembered that the implementation of ethnomathematics and cultural integration in mathematics learning requires a careful and structured approach. Teachers need to understand their students' culture well and ensure that mathematics learning remains the main focus. The teacher's ability to create relevant and satisfying learning experiences for all students is also key to the success of this approach. For this reason, it is recommended that ethnomathematics approaches and cultural



integration become an integral part of the mathematics education curriculum. Sufficient support from schools and mathematics curriculum providers is also necessary to ensure that the training and resource approaches can be implemented effectively for teachers.

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