JOURNAL OF INNOVATION AND RESEARCH IN PRIMARY EDUCATION | ISSN 2829-775X
Vol. 4, No. 3, 2025, 947-957
https://doi.org/10.56916/jirpe.v4i3.1472

Integrating Local Culture into Mathematics Learning: Ethnomathematics Approach Using Udeng Pacul Gowang in Elementary Schools

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Keywords
Etnomathematics
Udeng Pacul Gowang
Local Culture
Geometry
Cultural Integration

Article History
Received 2025-05-23
Accepted 2025-07-20

Abstract
This study investigates the integration of Udeng Pacul Gowang, a traditional headgear from Sidoarjo, Indonesia, into elementary mathematics education through an ethnomathematics approach. The purpose of this research is to explore the cultural and historical significance of Udeng Pacul Gowang, analyze its aesthetic design crafted by local artisans, and utilize it as a meaningful learning resource to enhance students' understanding of mathematical concepts. Using a descriptive qualitative method, the study gathered data through in-depth interviews with 12 local artisans and 8 elementary school educators, direct observations of the production process, and documentation review conducted over a three-month period from March to May 2025. The results indicate that Udeng Pacul Gowang incorporates various geometric shapes such as triangles, circles, and symmetrical patterns, which correspond to mathematical concepts including geometry, similarity, and measurement. Specifically, students were able to identify at least four types of geometric forms and apply measurement concepts through hands-on activities with the headgear. These cultural elements provide a contextualized and tangible learning experience that helps students relate abstract mathematical ideas to their everyday environment. Additionally, integrating Udeng Pacul Gowang in the learning process promotes students' cultural pride and appreciation for their local heritage, which positively impacts their motivation and engagement in mathematics. The study highlights the potential of culturally responsive teaching to bridge the gap between academic knowledge and cultural identity, encouraging the development of a more holistic learning approach. Despite the limited formal curriculum incorporation of ethnomathematics, this research emphasizes the role of educators in innovating teaching strategies by embedding local cultural artifacts in classroom activities. This approach not only enriches the mathematics curriculum but also supports the preservation of local culture among younger generations. The findings suggest that Udeng Pacul Gowang can serve as an effective educational tool to foster both mathematical proficiency and cultural awareness in elementary schools.

INTRODUCTION

Indonesia is a country rich in cultural diversity, which includes regional languages, arts, customs, traditional foods, and traditional clothing that have noble and philosophical values. This cultural wealth is a great potential in the world of education, especially in the development of learning based on local wisdom. One of the relevant approaches in integrating culture into learning is ethnomathematics, which is an approach that links mathematical concepts with local cultural practices (Widyaningrum & Prihastari, 2021). Ethnomathematics provides a space for students to understand mathematics in a real context that is close to their lives, so that learning becomes more meaningful (Wiryanto & Dewi, 2022). The application of ethnomathematics is important, especially at the elementary school level because students at this level are still in the operational concrete stage. Therefore, the integration of local cultures in mathematics learning can help students understand mathematical concepts in a more contextual and applicative way (Husna et al., 2024). However, the

implementation of ethnomathematics in elementary schools remains limited, particularly in the context of traditional cultural artifacts.

Sidoarjo Regency is known as an area rich in cultural heritage, especially those that come from the heritage of the Majapahit Kingdom. The uniqueness of Sidoarjo's culture lies not only in culinary and tourism, but also in its traditional fashion aspects, including Udeng Pacul Gowang which is a symbol of the identity of the local community (Mariana, 2025). This udeng has a distinctive shape and motif, and is made of Sidoarjo batik which reflects the richness of art and aesthetics of the local community. The existence of Udeng Pacul Gowang is not only a complement to clothing, but also as a symbol of regional pride that can strengthen the cultural identity of the younger generation. Unfortunately, many elementary school students do not know or are even reluctant to use this udeng in cultural activities organized by the school. In fact, the use of udeng can be used as an interdisciplinary learning medium that combines cultural aspects with subjects such as mathematics (Gawen et al., 2021). By understanding the shape and structure of the udeng, students can learn concepts such as geometry, measurement, and mathematical patterns firsthand. Therefore, there is a need to make efforts to introduce Udeng Pacul Gowang to students through integration in formal learning, especially mathematics.

Mathematics learning in primary school is often considered a difficult and boring subject due to its abstract and non-contextual delivery. This can lead to low student interest and understanding of mathematics. One approach to address this is to associate math material with real life and local culture that is familiar to students (Solihin & Rahmawati, 2024). Ethnomathematics offers a solution by utilizing culture as a learning resource, so that students can learn mathematics through their own cultural experiences (Khaerani et al., 2024). In this context, the creation and analysis of Udeng Pacul Gowang can be used as a medium to teach various mathematical concepts such as symmetry, angles, flat shapes, and calculation operations. This activity not only enhances students' cognitive understanding of math, but also fosters a sense of love and pride in the local culture. In addition, students' involvement in the process of making udeng also develops their psychomotor and affective aspects. Thus, learning mathematics becomes more fun, meaningful, and rooted in culture.

Despite the increasing literature on ethnomathematics, there is a noticeable lack of studies that specifically explore the use of traditional clothing elements, such as Udeng Pacul Gowang, as concrete learning media in the mathematics classroom. Most previous studies have focused on traditional games, culinary traditions, and architectural forms, leaving a gap in research concerning fashion-based cultural artifacts and their mathematical relevance. The use of local culture as a learning medium has been encouraged in various education policies that emphasize the importance of local wisdom as part of strengthening the nation's character. The government through the independent learning curriculum provides space for schools to develop learning materials based on local contexts that are in accordance with the needs and environment of students (Turmuzi et al., 2022). In this case, Udeng Pacul Gowang can be used as an innovative teaching material that not only introduces local culture, but also integrates mathematical values in it. The process of making udeng that involves measuring fabric, calculating crease angles, and symmetry patterns can be used as a fun and interactive learning experience. This study specifically addresses the lack of culturally integrated mathematics learning by proposing the incorporation of Udeng Pacul Gowang in elementary school mathematics lessons. The research focuses on exploring its cultural significance and mathematical potential as a teaching tool, aiming to bridge the gap between abstract mathematics and students' real-world cultural contexts. Thus, the research problem of this study is: How can Udeng Pacul Gowang be effectively integrated into mathematics learning in elementary schools through an ethnomathematics approach to improve students' conceptual understanding and cultural appreciation? Research examining the relationship between local culture and mathematics learning is still relatively limited, especially those that focus on traditional clothing such as udeng. Therefore, it is important to conduct in-depth research related to the potential of Udeng Pacul Gowang as an ethnomathematics-based mathematics learning medium. This research is expected to contribute to the development of

curricula and learning strategies that are contextual and relevant to students' cultures. Thus, students not only master the academic aspect, but also understand and preserve their own culture (Ardiyanti et al., 2024).

Within the framework of ethnopedagogy, education should be inseparable from the social and cultural environment in which students grow and develop. Every cultural element has the potential to be used as a contextual and authentic learning resource. This is in line with the view that good education is education that is able to make culture the foundation in building students' knowledge (Solihin et al., 2025). The integration of Udeng Pacul Gowang in mathematics learning is a tangible manifestation of the implementation of ethnopedagogy, where students can understand mathematical concepts through cultural activities that they are familiar with. With this approach, students can develop the ability to think critically, creatively, and solve problems holistically. In addition, students are also trained to appreciate the local culture and feel a sense of belonging to their ancestral heritage. This effort not only improves the quality of learning, but also strengthens the nation's cultural identity and character (Hartanti & Ramlah, 2021). Therefore, collaboration between schools, teachers, the government, and local communities is needed in developing this culture-based learning model.

Based on this description, it can be concluded that the integration of local cultures such as Udeng Pacul Gowang into mathematics learning has high urgency, especially in creating contextual, fun, and meaningful learning for elementary school students. In addition to helping students understand mathematical concepts better, this approach also plays a role in the preservation of local culture that is beginning to be eroded by the currents of globalization (Rambung et al., 2023). This research aims to delve deeper into the cultural, mathematical, and educational dimensions of Udeng Pacul Gowang, with the goal of formulating practical strategies for its integration into mathematics learning. Through a qualitative descriptive method, this study will describe in detail the process of cultural and mathematical integration in classroom practice. The findings of this study are expected to be the basis for the development of a curriculum based on local wisdom in various regions in Indonesia. Thus, education is not only a means of knowledge transfer, but also a vehicle for cultural preservation. Integration like this also contributes to strengthening students' character through love for their own culture. Therefore, there needs to be support from all parties in implementing culture-based education in a comprehensive and sustainable manner.

METHODS

This study employs a descriptive qualitative research method aimed at gaining an in-depth understanding of the phenomenon by collecting descriptive data. Descriptive qualitative research focuses on detailed descriptions and interpretations of a particular social reality without manipulation of variables. According to Miles & Huberman (2013), this approach allows for contextual comprehension of human experiences, behaviors, and emotions, providing a richer interpretation aligned with the sociocultural context of the participants. In the context of this study, such an approach is suitable for exploring the integration of cultural elements into mathematics education, particularly in understanding how students interact with and interpret local cultural artifacts like the *Udeng Pacul Gowang*. The central focus of this research lies in exploring and understanding the use of *Udeng Pacul Gowang* as a culturally-based learning resource in elementary mathematics education through an ethnomathematical perspective. This includes documenting the historical background, crafting process, aesthetic structure, and symbolic functions of the *Udeng Pacul Gowang*. This study was conducted in four elementary schools in Sidoarjo Regency over a three-month period from March to May 2025. Participants consisted of 12 local artisans, 8 elementary school teachers, and 30 students from grades IV and V, selected using purposive sampling based on their involvement in cultural activities.

The research aims not only to record factual data but also to explore the subjective experiences, perceptions, and interpretations of students, teachers, and community members

concerning the cultural values embedded within the *udeng*. By doing so, the study seeks to understand how cultural appreciation and mathematical learning can be interwoven meaningfully in classroom contexts. To ensure the credibility and depth of data collection, this study adopts triangulation as the primary data-gathering technique. Triangulation refers to the use of multiple data sources or perspectives typically three or more to enhance the richness and validity of the findings. The methods employed include (1) semi-structured interviews with stakeholders (teachers, students, and artisans), (2) direct observation of the learning process and udeng-making practices, and (3) documentation review, including written records and visual materials. The semi-structured interviews used a set of guiding questions, such as: "What mathematical concepts can you identify from the Udeng Pacul Gowang?", "How do students respond to learning activities involving cultural artifacts?", and "What cultural values are reflected in the udeng?" Observations were guided by an observation sheet that focused on student engagement, interaction with cultural artifacts, and the application of mathematical concepts during classroom activities and field visits to artisans. Data analysis was conducted following Miles & Huberman's (2013) interactive model, involving three key steps: (1) data reduction by coding and categorizing interview transcripts, observation notes, and documents to identify relevant themes; (2) data display by organizing findings in matrix tables and thematic charts for easier interpretation; and (3) conclusion drawing and verification by continuously comparing data sources and seeking confirmation from participants through member-checking to enhance validity. The overall research procedure followed these steps: (1) problem formulation, (2) preparation of research instruments (interview guide, observation sheet), (3) data collection in schools and artisan communities, (4) data analysis with triangulation techniques, and (5) drawing conclusions and formulating recommendations for curriculum development. Through this approach, the research intends to demonstrate how *Udeng Pacul Gowang* can serve as an effective ethnomathematical learning tool that enhances both mathematical understanding and cultural awareness among elementary school students.

RESULTS AND DISCUSSION

Results

The results of this study were collected through a triangulated approach consisting of interviews with key cultural figures, classroom and community observations, and document analysis. Each method contributed uniquely to understanding the historical, mathematical, and educational significance of Udeng Pacul Gowang in the context of ethnomathematics-based elementary education.

Historical and Cultural Exploration

Through in-depth interviews, it was discovered that the Udeng Pacul Gowang is not just a head covering, but a cultural legacy rich in meaning. As explained by Abdul Rosid, an elder craftsman, the origins of this udeng date back to the era of the Jenggolo warriors, who traditionally used simple rectangular pieces of cloth tied around their heads. Over centuries, the design evolved into the structured and ornamented Udeng Pacul Gowang used today, primarily made from Sidoarjo batik, known for its vibrant colors and symmetrical motifs. Artisan Achmad Irfandi emphasized that this transformation was driven by the community's effort to modernize traditional identity while preserving its symbolic values. Crafting the udeng involves meticulous steps: selecting the appropriate batik fabric, precise measurement, cutting, folding at specific angles, and assembling parts using EVA foam, merimes foam, and specialized sewing techniques. This evolution not only made the udeng easier to wear but added aesthetic and cultural depth.

Figure 1. Interview Session with Key Informants

During the interview phase, the research team engaged with three key informants: Abdul Rosid, a senior craftsman of Udeng Pacul Gowang; Achmad Irfandi, founder of *Kampung Lali Gadget* and also a cultural artisan; and Reni, a female artisan who specializes in motif composition and batik alignment in the udeng production process. Through these interviews, it was revealed that the Udeng Pacul Gowang has deep historical roots, originating from the attire of Jenggolo warriors during the Majapahit era. Originally, it was a simple rectangular headband made from plain woven fabric. Over time, this evolved into a more practical and artistic form, utilizing modern materials such as EVA foam, merimes foam, and batik cloth native to Sidoarjo. This transformation was not only functional but also cultural, reflecting a community effort to preserve tradition through modernization.

From a historical standpoint, the name *Pacul Gowang* holds symbolic meaning. The word *"pacul"* translates to *"hoe"*, symbolizing the agrarian roots of the Sidoarjo community, while *"gowang"* refers to a *hole* or opening, reflecting the philosophical balance between openness and humility. Functionally, the Udeng Pacul Gowang is now worn not only by traditional dancers and tourism ambassadors (*Guk Yuk Sidoarjo*) but also by government officials during formal occasions, reaffirming its role as a cultural symbol and identity marker.

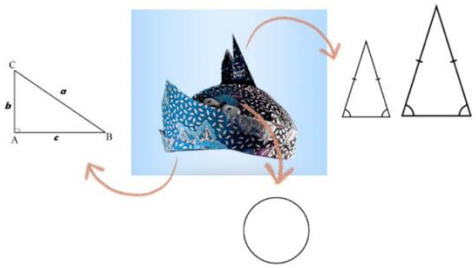

Figure 2. Ethnomathematics in Udeng Pacul Gowang

From the figure above, it can be analyzed that the geometric concept of triangular plane shapes is found in the pattern of the *Udeng Pacul Gowang*, particularly in the two upright *cungkup* and the pointed *bucen*.

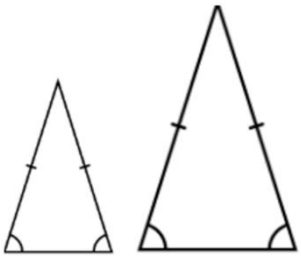

Figure 3. Ethnomathematics Detailing Plane Shapes in Udeng Pacul Gowang

Observations and gathered information indicate that the isosceles triangle shape on the two *cungkup* symbolizes the characteristic of warriors who must always remember God Almighty. The upright posture of the two *cungkup* represents the bravery of the warriors. In mathematical terms, this concept refers to similarity (congruence). A plane figure is similar if and only if the two shapes have the same form and proportional size, where corresponding sides are in the same ratio, and corresponding angles are equal.

The pointed *bucen* of the *Udeng Pacul Gowang* contains geometric elements in the form of a right triangle with a sharp peak resembling a mountain, symbolizing strength and steadfastness, as shown below.

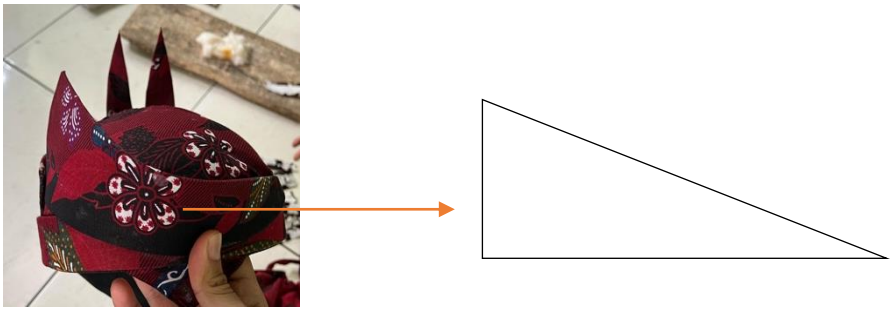

Figure 4. Right Triangle Geometry on Pointed Bucen

The head covering part of the *Udeng Pacul Gowang* also incorporates geometric concepts, including a circle representing the diameter of the head and a semicircle that partially covers the head. The symbolic meaning behind this partially open head covering, known by Sidoarjo artisans as *"Gowang"*, reflects a balance between what must be kept private and an openness to external opinions. Meanwhile, the *penutup tengkuk* (neck cover) fully covers the nape, symbolizing the warrior's ability to self-reflect before blaming others.

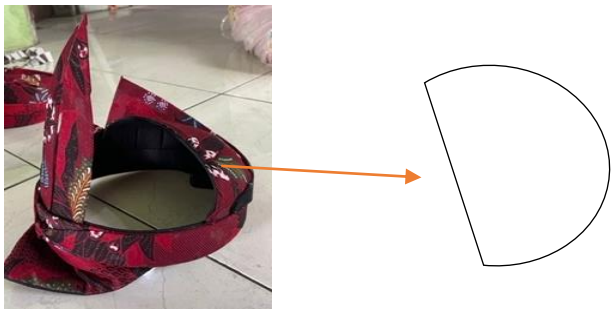

Figure 5. Semicircular Head Covering of Udeng Pacul Gowang

In summary, the *Udeng Pacul Gowang* can indirectly aid students in understanding plane geometric shapes. Incorporating contextual concepts when teaching mathematics helps students grasp mathematical ideas while expanding their cultural knowledge. The research findings demonstrate that mathematical concepts can be derived from cultural elements and can be effectively applied during mathematics instruction in schools. Thus, the use of ethnomathematics in mathematics learning can have a positive impact.

The findings of this ethnomathematical exploration on the *Udeng Pacul Gowang* indicate that the ethnomathematical approach can be employed in mathematics education to enhance students' understanding and mathematical skills. Although there is currently no consistent curriculum that integrates ethnomathematics, educators can implement a "learning through culture" approach to enrich learning resources and make lessons more relevant and engaging.

Based on interviews, observations, and document analysis, the following key themes emerged from the data:

1) The Udeng Pacul Gowang contains identifiable geometric patterns, including isosceles triangles, right triangles, circles, semicircles, and rectangles.
2) Cultural symbolic meanings align closely with mathematical properties, creating a rich interdisciplinary learning context.
3) Students show increased engagement, motivation, and comprehension when local cultural artifacts are used as teaching media.
4) Teachers acknowledged the practicality and accessibility of using such local materials in making mathematics learning more meaningful.
5) The hands-on, tactile experience improved students' spatial reasoning, measurement accuracy, and understanding of symmetry.

These results affirm the hypothesis that local culture can serve as a living textbook for introducing core mathematical concepts in elementary schools. Through the tangible example of Udeng Pacul Gowang, educators can connect abstract mathematics to daily cultural realities, helping students understand that mathematics is not only a school subject but also a part of their heritage and identity.

Discussion

This study succeeded in identifying that *Udeng Pacul Gowang* not only has strong cultural values, but also stores ethnomathematical concepts that can be integrated in mathematics learning in elementary schools. This finding is in line with the opinion of Rizky & Nasution (2024) who stated that local culture can be an effective source of mathematics learning by utilizing the values inherent in the cultural object. Furthermore, the geometric patterns in *Udeng Pacul Gowang*, such as the isosceles triangle and the right triangle, prove the potential to teach the concept of coexistence and the properties of flat building contextually. This concept of coexistence is very relevant to the mathematics curriculum that emphasizes the understanding of shapes and sizes (Nurcahyono & Putra, 2022). This study also found that the use of symbolism in *udeng* such as warrior courage and balance of mind can enrich students' meaning of mathematical material and cultural values at the same time. Therefore, the integration of ethnomathematical approaches can increase students' motivation and understanding of mathematical concepts (Rahayu et al., 2025). In addition, the results of interviews with artisans and cultural actors strengthen the validity of the findings by affirming the historical value and symbolic function of *Udeng Pacul Gowang*. Thus, learning mathematics that utilizes local culture not only improves the cognitive aspect but also the affective aspect of students.

Furthermore, this study shows that the process of making *Udeng Pacul Gowang* involving various local techniques and materials provides opportunities to teach mathematical concepts such as measurement, symmetry, and proportions in real terms. This is in accordance with Serepinah & Nurhasanah (2023) who stated that traditional mathematics found in everyday cultural activities can be a bridge between academic mathematics and students' life experiences. Direct observation in this study reveals the existence of complex patterns of repetition and symmetry, which, when integrated into learning, can improve students' visual and spatial skills (Zulfa et al., 2023). Research also indicates that the use of additives such as sponges and foam in the process of making *shrimp* is an example of dynamic cultural adaptation, which can be a topic of math learning about materials and volume. These findings confirm the importance of local contexts in creating meaningful and relevant learning experiences for students (Solihin & Habibie, 2024). Therefore, teachers need to be trained to be able to integrate ethnomathematics in daily learning practices effectively (Susiliastini & Sujana, 2022). A learning approach based on local culture also has the potential to increase students' sense of identity and pride in their own culture, while strengthening math learning. Thus, *Udeng Pacul Gowang* can be used as an interdisciplinary learning medium that combines aspects of art, culture, and mathematics in harmony.

The results of the interview revealed that the community and cultural actors view *Udeng Pacul Gowang* as a symbol of identity and cultural preservation that has high aesthetic value and social function. This is in line with Fadhilah (2024) regarding the importance of cultural context in understanding the social meaning of an object. In addition, the existence of *Udeng Pacul Gowang* in official activities and traditional ceremonies shows that these cultural values continue to be inherited and appreciated in a sustainable manner. This research emphasizes that the introduction of cultural values through *udeng* can increase students' cultural awareness while strengthening mathematics learning. The concept of balance represented by the form of *gowang* in *udeng* is a reflection of local philosophy that can be used as a foundation in value-based mathematics learning. Therefore, ethnomathematics learning can play a role in the development of students' character and moral values (Amelia et al., 2025). Furthermore, these results provide important implications for the development of a more inclusive and local culture-based curriculum. This is in line with Pare & Sihotang (2023) to strengthen culture-based education in order to realize relevant and contextual education.

Geometric analysis of *the Udeng Pacul Gowang* pattern shows that the use of triangle and circle shapes not only has an aesthetic function but also contains profound mathematical value. As stated by Faturrahman & Soro (2021), geometry in traditional culture often contains important symbolic and cultural meanings. In the context of *Udeng Pacul Gowang*, the shape of an isosceles triangle and a right triangle symbolizes courage and fortitude, which can be mathematically used to teach the concept of coexistence and the nature of angles. Similarly, the use of circles and semicircles as part of the head cover carries a message of balance that can be attributed to the concept of symmetry and diameter. The integration of this symbolism in math learning can help students relate abstract concepts to their everyday realities (Nova & Son, 2022). These findings reinforce the argument that cultural context is an important medium for teaching mathematics meaningfully. This approach also has the potential to improve students' critical and analytical thinking skills through reflection on the cultural values it contains. Therefore, this research contributes to the development of a holistic mathematics learning model rooted in local culture.

This research also highlights the importance of the role of teachers in implementing the *Udeng Pacul Gowang-based* ethnomathematics approach as a learning resource. Teachers must be able to connect mathematics content with cultural context so that learning becomes more contextual and meaningful (Nurcahyono & Putra, 2022). In addition, support from schools and local governments is needed to provide adequate facilities and training in the development of culture-based learning resources. Research by Putra & Prasetyo (2022) shows that the success of cultural integration in mathematics learning is highly dependent on teachers' readiness and understanding of the cultural context. With a good understanding, teachers can harness the potential of local culture to increase students' motivation and learning achievement. Furthermore, the ethnomathematical approach is not only beneficial for mathematics subjects, but it can also reinforce cross-disciplinary lessons such as art and history. Thus, *Udeng Pacul Gowang* is not only a cultural heritage but also an effective pedagogical tool. The implications of these findings are important for education policies that support culture-based learning.

Furthermore, this study confirms that the use of *Udeng Pacul Gowang* in mathematics learning can help students understand mathematical concepts more easily and fun. This is in accordance with findings (Mardhotillah & Yazidah, 2023) which state that learning that is contextual and relevant to students' lives is able to increase understanding and interest in learning. Through ethnomathematical exploration, students are invited to observe, analyze, and reflect on geometric patterns in *udeng* so that learning becomes interactive and participatory. This approach also accommodates the diversity of students' learning styles, including those who are more responsive to visual and kinesthetic media (Faturrahman & Soro, 2021). Therefore, the use of cultural media such as *Udeng Pacul Gowang* can enrich teaching methods and expand the scope of learning resources. This research also underscores the importance of cultural preservation and preservation as part of a sustainable educational process.

Thus, the integration of ethnomathematics based on local culture is an effective strategy in future mathematics learning.

In addition, this research contributes to the development of science through an interdisciplinary approach that connects culture, mathematics, and education. As expressed by (Sultan, 2023), mathematics does not stand alone but interacts closely with social and cultural aspects. This study illustrates how cultural objects such as *Udeng Pacul Gowang* can be a rich and contextual source of mathematical knowledge. This approach opens up opportunities for the development of a curriculum that is more inclusive and responsive to local needs. The research also encourages dialogue between academics, educators, and cultural communities in a joint effort to enrich mathematics education (Machaba & Dhlamini, 2021). Thus, this study provides a concrete example of the use of local culture as an innovative learning medium. This implication is important to strengthen education that respects local wisdom while developing students' overall mathematical competence.

Finally, this study recommends the need for further development related to the integration of *Udeng Pacul Gowang* in formal and informal learning materials. The ethnomathematical approach must be adapted to the national curriculum so that it can be applied widely and systematically. In addition, further research is needed to evaluate the effectiveness of culture-based learning on students' learning achievement and attitudes empirically. In line with the opinion of Wulandari et al. (2024), adaptation of cultural context in education requires a systemic and participatory approach. Therefore, collaboration between the government, schools, and cultural communities is crucial in developing ethnomathematics learning resources. This research also confirms the importance of continuous training for teachers in implementing a cultural approach. Thus, the development of *Udeng Pacul Gowang-based* learning has great potential to enrich mathematics education in Indonesia and improve the quality of learning in general.

CONCLUSION

This study demonstrates that *Udeng Pacul Gowang* holds significant cultural and mathematical values that can be effectively integrated into elementary mathematics education through an ethnomathematics approach. The geometric patterns embedded in *Udeng Pacul Gowang*, such as triangles and circles, provide concrete examples to teach mathematical concepts like similarity, symmetry, and measurement in a culturally relevant context. Incorporating these cultural artifacts into teaching not only enhances students' conceptual understanding but also fosters appreciation and pride in their local heritage. Furthermore, this approach promotes active learning by connecting abstract mathematical ideas to students' lived experiences, thereby increasing motivation and engagement. The role of educators is crucial in contextualizing and adapting these cultural elements within the curriculum to optimize learning outcomes. Although formal inclusion of ethnomathematics in the curriculum remains limited, this study suggests practical strategies for integrating cultural content to enrich mathematics education. Ultimately, utilizing *Udeng Pacul Gowang* as a learning resource bridges the gap between cultural knowledge and academic mathematics, contributing to a more inclusive and meaningful educational experience. Future research is recommended to explore the long-term impact of this approach on students' academic performance and cultural identity development.

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