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Ethnomathematics in Kembang Kerang Woven Fabric

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Abstract

This study aims to explore the interconnectedness between mathematical concepts and cultural values embedded in *Kembang Kerang* woven fabric as part of an ethnomathematics inquiry. This traditional textile not only functions as a cultural artifact but also embodies mathematical patterns in the form of geometry, symmetry, transformation, and repetition, which can be utilized in contextual mathematics learning. The research employed a descriptive qualitative approach with ethnographic methods through observation, interviews, and documentation. The findings reveal that the *Kembang Kerang* motifs contain geometric patterns such as triangles, parallelograms, and rhombuses, applying principles of transformation including translation, reflection, and rotation. Furthermore, the motifs represent the Sasak community's philosophical values related to harmony, balance, and the human–nature relationship. This study affirms that ethnomathematics not only enriches academic discourse but also contributes to the preservation of local culture and the development of learning media relevant to students' contexts.

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Introduction

Ethnomathematics is a relatively new field of study that has increasingly attracted attention in the academic world, particularly in relation to culture-based mathematics education. The term *ethnomathematics* was introduced by Ubiratan D'Ambrosio in the 1970s to describe mathematical practices developed within specific cultural communities (D'Ambrosio, 2016). Understanding ethnomathematics is important because it demonstrates that mathematics is not merely an abstract and universal discipline, but one that is also shaped by the values, traditions, and sociocultural contexts in which it is practiced (Hidayati & Prahmana, 2022; Iskandar et al., 2022).

In the Indonesian context, ethnomathematics research holds significant relevance due to the country's cultural diversity. Each region of the archipelago possesses a wealth of cultural expressions reflected in architecture, batik motifs, wood carvings, weaving, and traditional rituals. These cultural expressions inherently contain mathematical traces in the form of patterns, symmetries, transformations, and calculations, which can be revealed through scientific analysis (Hamid, 2022; Sari et al., 2024). Thus, the exploration of ethnomathematics in Indonesia not only enriches academic knowledge but also contributes to cultural preservation and the development of more contextual teaching strategies.

One of the cultural heritages that merits investigation from an ethnomathematics perspective is the *Kembang Kerang* woven fabric from East Lombok, West Nusa Tenggara. This textile features distinctive motifs resembling seashells, arranged in repetitive and symmetrical patterns. Visually, the *Kembang Kerang* motif incorporates combinations of triangles, parallelograms, and rhombuses, with a high degree of regularity that

can be readily identified from a mathematical standpoint (Azizah & Ananda, n.d.; Harahap & Mujib, 2022). Beyond its geometric features, the motif is also imbued with philosophical meanings that reflect the worldview of the Sasak community, particularly regarding harmony, fertility, and the relationship between humans and the natural environment (Qatrunnada et al., 2024; Sirait et al., 2023).

Previous studies have shown that traditional textiles often embody significant mathematical values. For example, Deda (2019) identified various geometric concepts in the motifs of *Kefamenanu* weaving from East Nusa Tenggara, while Hamid (2022) examined *tapis* from Lampung and found a close relationship between geometric patterns and the cultural symbols of the local community. Other studies on Javanese batik, Malay *songket*, and Batak *ulos* have also demonstrated the interconnectedness between cultural values and mathematical concepts (Elvi Mailani et al., 2024; Jatayu et al., 2024; Panjaitan, 2024). These findings strengthen the argument that the *Kembang Kerang* woven fabric likely contains ethnomathematical aspects that warrant systematic investigation.

This study is not only important for documenting local cultural heritage but also has pedagogical implications, particularly for mathematics education. By utilizing woven motifs as learning media, students can engage with mathematics in a more contextual, meaningful, and relevant way, closely linked to their everyday lives (Okta Marinka et al., 2018; Okti Yolanda & Putra, 2022). Such an approach aligns with Indonesia's current educational policy, namely the implementation of the *Merdeka Belajar* curriculum, which emphasizes the integration of academic knowledge with students' cultural realities.

Based on this background, the present study is designed with a focus on two central questions: (1) What mathematical concepts are embedded in the *Kembang Kerang* motif? and (2) How are these motifs connected to the local cultural values of the Sasak community? The objectives of this research are to describe the mathematical elements of the *Kembang Kerang* woven fabric and to analyze the cultural values it conveys, while also identifying the potential for integrating these motifs into mathematics learning. Accordingly, this study is expected to contribute to two key areas: the advancement of ethnomathematics as an academic discipline and the preservation of local cultural heritage.

Literature Review

Ethnomathematics as a Conceptual Framework

Ethnomathematics is defined as the way a cultural group organizes, understands, and applies mathematical concepts in daily life (D'Ambrosio, 2016). Recent studies have shown that ethnomathematics plays a significant role in bridging mathematics learning with students' real-life contexts (Kabuye Batiibwe, 2024; Kyeremeh, 2023). In the educational framework, ethnomathematics fosters the understanding that mathematics is not a discipline detached from context; rather, it manifests in cultural activities such as weaving, batik-making, and traditional architecture (Iskandar et al., 2022).

A systematic review by Hidayati and Prahmana (2022) found that ethnomathematics research in Indonesia between 2015–2020 was dominated by explorations of batik motifs, traditional house architecture, and traditional textiles. Similarly, Okti Yolanda and Putra (2022) emphasized that batik, as a cultural heritage, contains various geometric patterns, transformations, and symmetrical concepts that can serve as effective learning media in mathematics education. These findings suggest that ethnomathematics research in the Indonesian archipelago has frequently focused on traditional textiles as one of the primary objects of inquiry.

Woven Fabrics as Objects of Ethnomathematics Research

Traditional woven fabrics represent cultural artifacts that embody rich mathematical symbolism. Deda (2019) identified geometric forms such as triangles, squares, and repetitive patterns in the motifs of *Kefamenanu* weaving. Hamid's (2022) research on *tapis* from Lampung also demonstrated a close connection between geometric patterns and the cultural values of the Lampung community. Similarly, Panjaitan (2024) revealed the presence of geometric transformations in the motifs of *songket* from Sambas.

Recent studies further reinforce the role of woven fabrics as media for ethnomathematics learning. For instance, Puling (2024) explored *Alor* woven sarongs as a medium for teaching basic geometry and addition to early childhood learners. Likewise, Sari et al. (2024) highlighted that Indonesian woven fabrics have strong potential as contexts for teaching geometry. Thus, the *Kembang Kerang* motif, which has not yet been widely studied, can offer new contributions to the growing body of ethnomathematics literature in Indonesia.

Integration of Ethnomathematics into Mathematics Learning

Integrating ethnomathematics into mathematics education offers several benefits. First, it enhances students' conceptual understanding through contextual learning media (Okta Marinka et al., 2018). Second, it strengthens students' cultural identity by incorporating local heritage into the classroom (Rahmawati & Muchlian, 2019). Third, it promotes meaningful learning that goes beyond cognitive aspects to include affective and psychomotor dimensions (Wedastuti, 2023).

Jatayu et al. (2024) demonstrated how batik-making practices can be utilized to teach concepts of symmetry and transformation in primary schools. Similarly, Suherman (2022) showed that *tapis* patterns from Lampung can be integrated into geometry lessons. In another study, Triani Purba et al. (2022) examined *ulos Sadum* motifs, showing that traditional textiles can be employed to introduce students to two-dimensional geometric shapes.

Local Wisdom and Cultural Values

Beyond mathematical aspects, ethnomathematics also highlights the cultural values embedded in traditional artifacts. Albani et al. (n.d.) underscored the importance of appreciating local wisdom expressed in traditional ornaments, while Sirait et al. (2023) revealed the philosophical meaning of symmetry in Batak *ulos* as a representation of cosmic balance. Wijayanti (2023) further illustrated that religious symbols, such as the emblem of *Nahdlatul Ulama (NU)*, can be analyzed from both philosophical and mathematical perspectives.

In the context of the *Kembang Kerang* woven fabric, the cultural values represented in its motifs include symbols of fertility, balance, and a deep connection with the marine environment, which plays a central role in the life of the Sasak people (Putrajip, 2024; Qatrunnada et al., 2024). This indicates that ethnomathematics analysis cannot be separated from the philosophical and anthropological dimensions underlying the creation of such motifs.

Materials and Methods

This study employed a qualitative approach with a descriptive ethnographic design. This approach was chosen because the main focus of the research was not merely to describe mathematical patterns in the Kembang Kerang woven motifs but also to reveal the accompanying cultural meanings. As emphasized by Creswell (2018), ethnography enables researchers to understand specific cultural practices through direct interaction with research subjects and their social environment. In this context, the Kembang Kerang textile is treated not only as a visual artifact but also as part of the knowledge system of the weaving community, which is rich in cultural values.

The research site was determined in the production centers where Kembang Kerang weaving is still actively practiced by local artisans. The location was selected purposively, considering the presence of traditional weavers who preserve hereditary techniques and motifs. The research participants consisted of experienced weavers, traditional leaders, and younger artisans involved in sustaining weaving traditions. This purposive sampling technique was deemed appropriate since the study required in-depth information from individuals who truly mastered and understood the symbolic meanings of woven motifs (Patton, 2015).

Data collection was conducted through three main techniques. First, direct observation of the weaving process and the resulting products. The researcher recorded visual patterns, motif repetitions, and color compositions, which were subsequently analyzed through a mathematical lens. Such visual observation is crucial, as many concepts of geometry and symmetry can only be identified through detailed examination of the fabric's structure (Suryaningtyas & Priyanto, 2018). Second, in-depth interviews were conducted with weavers and community leaders to gain an understanding of the philosophies embedded within the motifs. This method allowed the researcher to uncover meanings that are often unwritten but transmitted orally across generations (Spradley, 2016). Third, documentation in the form of detailed photographs, motif sketches, and archival materials of community-owned woven fabrics was collected. This documentation served as verification material and as a medium to examine mathematical elements such as reflective symmetry, transformations, and numerical patterns (Rosa & Orey, 2016).

Data analysis was conducted through two interrelated pathways. The first involved a mathematical analysis of the motifs, which encompassed identifying geometric elements, symmetries, and transformations. In this phase, the researcher adopted the ethnomathematical framework that emphasizes the relationship between cultural practices and formal mathematical concepts (D'Ambrosio, 2001; Rosa & Orey, 2017). The second pathway consisted of a qualitative analysis of interview transcripts and field notes. Oral data were transcribed and subsequently coded to identify key themes related to cultural values, motif philosophies, and their connections to the social life of weaving communities. Both forms of analysis complemented one another, ensuring that the findings highlighted not only the mathematical aspects but also the cultural narratives embedded within the motifs.

To ensure data validity, this study employed source triangulation. Information obtained from observation was compared with interview results and documentation. In cases where discrepancies emerged, clarification was sought from informants or observations were repeated. This procedure was essential to ensure that the research findings did not rely on a single perception but instead represented the actual field reality (Moleong, 2019). Moreover, the researcher's direct involvement in the site for an extended period provided an opportunity to build trust with informants, thereby enhancing the authenticity of the collected data.

In analyzing the mathematical elements, the researcher also referred to the theories of geometric transformations and symmetry concepts as applied in previous ethnomathematical studies. For example, Priyanto (2018) demonstrated how traditional batik patterns often contain complex mathematical structures. Based on this framework, the Kembang Kerang motifs were examined not only as decorative ornaments but also as representations of reflection, rotation, translation, and dilation.

Through this methodological approach, the research sought to connect two dimensions: the aesthetic value of the motifs as a cultural expression and the mathematical regularities embedded within them. By integrating ethnography with mathematical analysis, this study presents a comprehensive perspective. Ultimately, the method not only reveals the aesthetic and cultural significance of Kembang Kerang woven textiles but also highlights their potential application in culturally contextualized mathematics education.

Results and Discussions

Identification of Kembang Kerang Motifs

The *Kembang Kerang* motif on woven fabric possesses a strong and immediately recognizable visual character. At first glance, the pattern resembles a blossoming sea flower or shell, framed by neatly arranged geometric lines. The motifs are repeated along the length of the fabric, creating both a sense of order and aesthetic appeal. Within the process of observation, the motif is not merely perceived as decoration but as a form of local knowledge inherited across generations. Embedded in every strand of thread lies mathematical traces intertwined with cultural values (Putrajip, 2024).

Closer examination reveals that the *Kembang Kerang* motif is composed of fundamental shapes such as circles, quadrilaterals, and rhombuses. These compositions form petal-like figures that interlock with one another, producing highly regular symmetrical patterns. The weavers' awareness of repetition and visual balance reflects an intuitive mathematical understanding, even though it is not expressed in algebraic language. Geometric concepts such as similarity, proportion, and reflective symmetry are evident within the structure of the motif (Deda, 2019; Suherman, 2022).

No two woven fabrics are ever entirely identical. Variations appear in the size of the petals, the density of the arrangement, and even the choice of colors, all of which influence the final impression of the pattern. These variations highlight the flexibility of weavers in translating tradition into unique works of art. From an ethnomathematical perspective, such variations can be viewed as forms of basic geometric transformations: translation when motifs are shifted, rotation when petal orientations are turned, or dilation when the motif size is enlarged or reduced (Elvi Mailani et al., 2024). These variations exemplify how creativity coexists with unwritten mathematical rules.

Beyond form, numerical considerations are also integral to motif identification. Within a single length of fabric, weavers typically determine the number of motifs based on specific multiples, such as four or eight. This practice relates to local beliefs that associate certain numbers with harmony or good fortune. At the same time, it demonstrates how number concepts are embedded within weaving traditions, inseparably linked to symbolic meanings (Okti Yolanda & Putra, 2022; Iskandar et al., 2022).

The *Kembang Kerang* motif also embodies layers of cultural significance. For the local community, shells symbolize resilience and protection. When incorporated into fabric design, the motif does not merely serve as embellishment but conveys messages of perseverance in coastal life. This symbolic dimension elevates the motif's importance, where visual beauty merges with stories narrated through threads and colors (Qatrunnada et al., 2024).

Insights from interviews with senior weavers further confirm this understanding. They emphasize that weaving is not solely an economic activity but also a means of preserving ancestral heritage. Each piece of cloth is regarded as a medium for storing narratives of identity while simultaneously nurturing the community's relationship with its surrounding environment. Within the ethnomathematical framework, this illustrates the close interconnection between mathematical patterns, cultural practices, and the philosophical values embedded in society (Albani et al., n.d.; Rosa & Orey, 2016).

Through such identification, the *Kembang Kerang* motif can be understood not only as ornamentation but also as a cultural text rich in mathematical concepts. The repeated patterns, symmetry, transformations, and numerical elements within it reflect the profound relationship between weaving traditions and mathematical thought. Each woven thread serves as a reminder that mathematics does not originate solely within classrooms but also in the weaving spaces, in the hands of women who preserve tradition.

Ethnomathematical Analysis: Geometry and Symmetry

The *kembang kerang* motif in woven textiles does not merely display visual aesthetics but also encapsulates mathematical concepts that can be distinctly identified. Upon closer examination, each strand of the cloth reveals how weavers organize threads to create forms that embody principles of geometry. Fundamental shapes such as circles, triangles, rhombuses, and squares emerge in the arrangement of petals and background patterns. This reflects that knowledge of form and order has long been embedded in cultural practices, even though it was not historically articulated in the terminology of formal mathematics (D'Ambrosio, 2016; Hamid, 2022).

One significant finding is the presence of reflectional symmetry. The *kembang kerang* motif typically presents four petals radiating toward a central point, forming quaternary symmetry. When represented in a geometrical framework, this pattern can be explained through folds that divide the shape into equally sized parts. This symmetry produces not only visual balance but also a symbolic harmony, resembling the equilibrium found in the bilateral structure of the human body. In cultural contexts, such harmony is often regarded as a representation of balanced living, both with nature and within the community (Sirait et al., 2023).

In addition to reflectional symmetry, rotational symmetry is also evident. The repetitive arrangement of petals four times around a central axis suggests a 90-degree rotational transformation on a plane. Such rotation creates a design that remains visually identical from multiple viewing angles, akin to a wheel maintaining its form while turning. When students are introduced to the concept of rotation through this motif, they not only learn about geometry but also recognize that mathematics exists in their immediate environment, such as in the traditional textiles worn by their mothers or grandmothers (Kyeremeh, 2023; Jatayu et al., 2024).

The use of straight lines in the textile's background further introduces the concept of reflection or mirroring. Patterns on one side frequently serve as a counterpart to the opposite side. For example, diagonal lines framing the motif appear to move in opposite directions, as though reflecting one another. This mirroring provides a tangible example of bilateral symmetry, which is often difficult for students to comprehend when explained solely through abstract diagrams on a blackboard (Harahap & Mujib, 2022).

Beyond symmetry, the motif also demonstrates translational properties. Each *kembang kerang* pattern is arranged sequentially at equal distances, producing a consistent repetition across the length of the textile. In geometry, translation refers to the shifting of a shape without altering its size or orientation. This practice illustrates how weavers manage patterns to remain coherent, even when weaving extends for several meters. Such awareness of distance and regularity is not merely a technical skill but also an expression of spatial reasoning (Azizah & Ananda, n.d.; Setiawan & Listiana, 2021).

Another transformation identifiable in the motif is dilation. Some weavers enlarge or reduce the size of petals, creating variation within a single textile. This dilation not only adds visual diversity but also demonstrates the intuitive application of scaling concepts. In mathematics, dilation involves enlarging or reducing a figure while maintaining proportionality. Interestingly, weavers apply this principle without naming it as "dilation," instead considering it a method of beautifying or adapting the motif to the width of the textile (Elvi Mailani et al., 2024; Panjaitan, 2024).

In addition to geometric transformations, numerical patterns are also embedded in the design. The number of petals, repetitions of motifs, and filler lines often follow specific rules. For instance, a textile length may repeat a motif eight times, or each motif consistently features four petals. These numerical choices are not arbitrary but carry symbolic significance in the local culture. For many weavers, even numbers are associated with balance, while odd numbers symbolize incompleteness. From a mathematical perspective, such structuring reflects the role of numbers in constructing visual design (Okta Marinka et al., 2018; Rakhmawati et al., 2016).

Taken together, these concepts demonstrate that *kembang kerang* woven textiles are not merely cultural artifacts but also serve as rich media for mathematical learning. Students can explore symmetry, transformation, and number theory through objects that are deeply rooted in their cultural heritage. This approach aligns with Rosa and Orey's (2017) perspective that ethnomathematics provides a bridge between cultural experience and formal educational concepts. In other words, woven textiles preserve tradition while simultaneously offering opportunities for meaningful learning.

Ultimately, this practice, transmitted across generations, integrates both aesthetics and logic. Each woven thread does not solely bind the fabric but also binds together culture and mathematics. The *kembang kerang* motif thus stands as evidence that geometry is not confined to classrooms but also thrives in the laps of weavers and in the small households that sustain cultural continuity.

Cultural Values Embedded in the Kembang Kerang Motif

The *kembang kerang* motif in woven textiles is not merely a composition of lines and shapes arranged with precision. Rather, it embodies stories, beliefs, and worldviews of the community that created it. When traced to its cultural roots, this motif emerges not simply as visual decoration but as a symbolic language that connects humans with nature, history, and social values transmitted across generations.

One of the most prominent meanings ascribed to the *kembang kerang* motif is its association with the sea. Its shape, resembling sea flowers or seashells, reflects the close relationship coastal communities maintain with their primary source of life. The sea is perceived not only as an economic space but also as a symbol of balance and continuity. Within local traditions, the sea is understood as both a giver and a tester of life. The motif thus serves as a reminder that existence continually oscillates between generosity and challenge.

Another cultural value embodied in the motif is the principle of order and harmony. The geometric lines encircling the shell-like form represent the social order envisioned by the community. The arrangement of patterns symbolizes norms that preserve interpersonal balance. Much like threads interwoven in a textile, individuals are bound together through collective strength. In this context, the *kembang kerang* motif functions as a medium that conveys the importance of solidarity and collectivity.

The motif also conveys spiritual messages. Across many cultures, shells have been associated with birth, fertility, and regeneration. This symbolism is also present in the woven textile tradition. For the artisans, each thread forming the *kembang kerang* pattern embodies a prayer for life to flourish and endure. This perspective illustrates that weaving is not merely a technical activity but also a spiritual practice connecting humans with the cosmos.

The transmission of weaving skills further underscores the cultural value embedded in the motif. Skills are typically passed from parents to children, not only as manual dexterity but also as a way of understanding life. Children learn the meanings behind motifs while simultaneously mastering weaving techniques. Thus, weaving functions as a form of cultural education, where the process itself instills values that reinforce community identity.

From an ethnomathematical perspective, these cultural meanings occupy a distinctive position. The *kembang kerang* motif illustrates how mathematical ideas are present in everyday life without being separated from local values. Geometry and symmetry within the motif are not mere aesthetic exercises but also expressions of a worldview. In this way, mathematics and culture converge within the motif, making it a tangible example of how scientific knowledge and local wisdom complement one another.

The motif also reflects the community's adaptive capacity in the face of change. Although the *kembang kerang* pattern has been inherited for generations, artisans often introduce variations in color or detail to meet contemporary market preferences. Yet the core of the motif is preserved. This balance between tradition and innovation exemplifies cultural resilience: the ability to remain rooted while engaging with evolving contexts.

In addition, the *kembang kerang* motif serves as a marker of identity. For the community that owns the tradition, wearing or displaying textiles with this motif signifies cultural origin and pride. Such visual identity has become increasingly important amid globalization, which often imposes homogeneity in style and taste. Traditional motifs, with their distinctiveness, offer subtle resistance to cultural homogenization, asserting: "This is who we are, with our unique heritage."

The socio-economic dimension is also inseparable from the motif. Textiles featuring the *kembang kerang* pattern are frequently used in customary ceremonies, weddings, and other significant events. Their presence carries prestige and respect while simultaneously providing economic opportunities for artisans. The cultural value embedded in the motif elevates the textile beyond its utilitarian function into a valued work of art. Consequently, the motif contributes to sustaining both local economies and cultural traditions.

At a deeper level, the *kembang kerang* motif illustrates that material culture, such as woven textiles, is intertwined with the ways communities ascribe meaning to life. What may appear as a simple visual pattern actually carries complex layers of meaning—spirituality, social harmony, and collective identity. This perspective aligns with Geertz's (1973) view of culture as a system of symbols that imbues human actions with meaning. Within this framework, the *kembang kerang* motif emerges as a symbol that continues to speak across generations.

Finally, the cultural values embedded in the *kembang kerang* motif become increasingly relevant in the context of modern life, where rapid change often leads to the neglect of traditional roots. This motif reminds us that beauty is found not only in physical form but also in the stories it conveys. It demonstrates that art and mathematics can coexist, that tradition and innovation can thrive together, and that identity can remain both strong and adaptive in the face of transformation.

Potential for Education

The *kembang kerang* woven holds significant potential as a learning resource, particularly in connecting local knowledge with mathematics education. A textile long present in the everyday lives of local communities can serve as an engaging entry point for understanding concepts such as geometry, symmetry, pattern repetition, and numerical regularity. Such an approach allows students to learn mathematics not only in its abstract form but also in relation to real-life experiences and the cultural heritage with which they are familiar.

For many students, mathematics is often perceived as distant from their reality. Numbers and formulas are regarded as a foreign world, disconnected from daily life. This is where the *kembang kerang* motif can play an important role. Imagine a teacher presenting a piece of woven cloth to students and inviting them to observe its shapes, patterns, and arrangements of lines. Suddenly, mathematics ceases to be confined to abstract equations on a blackboard; it is embodied in front of them, embedded in cultural heritage that resonates with the daily life of the Nusantara.

This ethnomathematical approach provides opportunities for more contextual learning. Students can explore symmetry through the repetition of shell-like shapes or examine number patterns through the systematic arrangement of motifs. More importantly, they begin to realize that mathematics is inseparable from culture

and human creativity. This notion aligns with Barton's (2008) view that mathematics is a cultural construct reflected in the practices of society.

Beyond enriching students' perspectives on mathematics, the use of the *kembang kerang* motif also reinforces cultural identity. Education is not only a matter of transmitting knowledge but also cultivating a sense of belonging to cultural heritage. Bringing woven textiles into the classroom enables students to engage with local values while fostering pride in tradition. They learn that modern scientific knowledge can coexist with, and even be strengthened by, local wisdom.

The motif also facilitates dialogue between younger generations and weaving artisans. Students may participate in field visits to weaving communities, observe the production process firsthand, and learn the stories embedded in the motifs. Such experiences extend learning beyond cognitive understanding to cultural immersion, teaching students to value perseverance, precision, and creativity—qualities equally vital in mathematics.

Another important potential lies in the motif's suitability for interdisciplinary learning. Mathematics teachers can highlight geometric concepts, art teachers may emphasize aesthetics and visual techniques, while history or anthropology teachers can situate the motif in its cultural context. This integrative approach fosters a holistic learning experience in which students perceive knowledge not as isolated domains but as interconnected networks.

The connection between the *kembang kerang* motif and mathematics education also cultivates critical and creative thinking skills. When students are tasked with analyzing patterns, identifying symmetries, or designing new motifs based on mathematical principles, they engage in problem-solving practices. They learn to view problems from multiple perspectives, discover hidden structures, and relate them to real-life contexts. These competencies are essential for the demands of the 21st century.

Effective implementation, however, requires carefully designed strategies. Teachers should not limit instruction to motif recognition but also encourage deeper exploration. For example, students might calculate the number of motif repetitions in a textile, analyze proportional relationships, or compare variations across regions. Such activities make learning interactive and nurture curiosity.

Furthermore, the *kembang kerang* motif can serve as a bridge to more abstract mathematical concepts. Repeated patterns may introduce geometric transformations such as translation, reflection, and rotation. Symmetry within the motif can serve as a foundation for understanding the properties of plane figures, while the calculation of threads or motif proportions can lead to lessons on ratios and proportions. In this way, traditional motifs provide intuitive pathways toward more complex mathematical ideas.

Within the Indonesian curriculum, this culturally grounded approach aligns with the principles of *Merdeka Belajar*, which emphasizes contextual, creative, and character-oriented learning. Utilizing woven textiles with the *kembang kerang* motif as learning media not only addresses academic goals but also cultivates cultural sensitivity and social awareness. Education, therefore, extends beyond cognitive achievements to the nurturing of identity and social responsibility.

The potential of the motif can also be extended through digital media. The *kembang kerang* design may be adapted into interactive learning applications, educational games, or multimedia content accessible to students. This ensures that cultural heritage is preserved not only in physical form but also within digital spaces closely linked to the daily lives of younger generations. Such digital transformation bridges tradition and technology, rendering learning more relevant in contemporary contexts.

Ultimately, the relevance of this traditional motif to modern education depends on how it is utilized. The *kembang kerang* motif has already proven its role as an aesthetic symbol, a marker of identity, and a vessel of knowledge. The task of education is to open spaces for this symbol to speak within the classroom, inspiring students to learn in more meaningful ways. In doing so, mathematics ceases to appear foreign, culture is no longer seen as separate, and learning becomes a more humanizing experience.

Conclusion

The study of the *kembang kerang* motif in woven textiles demonstrates that cultural heritage embodies more than aesthetic value; it also preserves traces of knowledge relevant to the field of education. The identification process reveals that this motif contains highly structured patterns, incorporating principles of geometry, symmetry, and mathematical regularity that may be utilized as pedagogical material. Beyond its formal structure, every woven pattern carries cultural values, life philosophies, and the collective identity of the community from which it originates. Thus, woven cloth should not merely be regarded as a material object, but as a visual narrative that reflects how societies perceive nature, organize knowledge, and transmit it through artistic creation.

Within the educational context, the *kembang kerang* motif provides meaningful opportunities for making mathematics more relatable to students' daily lives. Rather than approaching mathematics as an abstract and rigid discipline, this motif allows learning to emerge from cultural realities that are familiar to learners. Through an ethnomathematical perspective, students not only engage with numerical operations or geometric forms but also acquire an awareness of the interrelationship between scientific knowledge and cultural traditions. This approach confirms that education may serve as a dynamic meeting ground where tradition and modern science complement one another, fostering holistic development of knowledge and identity (Barton, 2008).

From a cultural standpoint, this study highlights the significance of preserving the *kembang kerang* woven textile. Each motif is not solely the product of artisanal skill but also functions as a repository of collective wisdom and lived experience. Integrating this motif into school curricula has the potential to enrich learning in two directions: while students explore mathematical principles, they simultaneously cultivate a sense of belonging to their cultural heritage. In this way, education becomes a medium not only for the transmission of knowledge but also for the safeguarding of traditions and the reinforcement of local identity (Geertz, 1973; Koentjaraningrat, 2009).

Based on these findings, several recommendations may be put forward. First, educators should adopt a more open stance toward the integration of culture-based learning resources. Traditional media such as woven cloth, batik, or other indigenous craft forms may serve as valuable instruments for teaching mathematical and scientific concepts. Second, greater collaboration between schools and weaving communities is necessary. Activities such as field visits, workshops, and collaborative projects would allow students to learn directly from artisans and gain authentic, experiential knowledge. Third, the support of policymakers is essential in promoting curriculum frameworks that incorporate local culture as well as in providing resources for interdisciplinary research linking scientific inquiry with indigenous knowledge systems (Sembiring et al., 2008).

Ultimately, this research demonstrates that the *kembang kerang* woven textile deserves recognition not only as a cultural artifact but also as an educational resource of considerable value. Teaching mathematics through weaving is not merely a matter of pedagogical strategy; it represents an act of cultural preservation, identity formation, and the nurturing of pride among younger generations in their own heritage. In this sense, education

assumes a dual role: advancing intellectual growth while simultaneously safeguarding cultural continuity for the future.

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