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EXPLORING FRIEZE PATTERNS IN *LOTIS* AMANUBAN WOVEN FABRICS: INTEGRATION OF *TEKE* AND *BIKLUSU* MOTIFS INTO MATHEMATICS EDUCATION

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Abstract

The *teke* (gecko) and *biklusu* (lizard) motifs, as distinctive features of *lotis* woven fabrics, represent not only symbolic and spiritual values in Amanuban culture but also embody complex mathematical structures. This study aims to identify the types of frieze patterns present in three different *teke* and *biklusu* motifs and to explore their potential for integration into mathematics education. A descriptive qualitative approach was employed, utilizing direct observation, documentation, and interviews with weavers and cultural elders. The primary data consisted of visual representations of the three motifs, which were analyzed through isometric transformations including translation, vertical and horizontal reflection, 180° rotation, and glide reflection. The classification was based on the seven types of frieze patterns as defined by the one-dimensional isometry group theory. The findings reveal that two motifs correspond to the F6 frieze pattern type, while one aligns with the F7 type, demonstrating varying degrees of geometric symmetry complexity. The *teke* and *biklusu* motifs can serve as effective contextual tools for mathematics instruction across educational levels, from pattern recognition in primary school to advanced discussions of isometry group theory in higher education. This approach aligns with the goals of the Merdeka Curriculum by linking mathematics learning to meaningful local contexts.

Keywords: Amanuban *lotis* weaving; *biklusu*; contextual learning, frieze patterns, *teke*.

Abstrak

Motif teke (tokek) dan biklusu (cecak) sebagai motif-motif khas kain tenun lotis tidak hanya merepresentasikan nilai-nilai simbolik dan spiritual dalam budaya masyarakat Amanuban, tetapi juga menyimpan struktur matematis yang kompleks. Penelitian ini bertujuan untuk mengidentifikasi jenis frieze pattern pada tiga motif tokek dan cecak yang berbeda serta mengkaji potensi integrasinya dalam pembelajaran matematika. Penelitian ini menggunakan metode kualitatif deskriptif dengan teknik pengumpulan data berupa observasi langsung, dokumentasi dan wawancara terhadap penenun dan tokoh adat. Data utama berupa visual dari tiga motif teke dan biklusu tenun lotis yang dianalisis melalui pengamatan struktur isometri yang meliputi translasi, refleksi vertikal dan horizontal, rotasi 180°, serta glide reflection. Kriteria klasifikasi mengikuti tujuh pola frieze berdasarkan teori grup isometri satu dimensi. Hasil penelitian menunjukkan bahwa dua motif termasuk frieze pattern tipe F6 dan satu motif tergolong F7 yang masing-masing mencerminkan tingkat kompleksitas simetri geometris berbeda. Motif tekek dan biklusu dapat digunakan sebagai media pembelajaran matematika kontekstual yang efektif pada setiap jenjang pendidikan mulai dari pengenalan pola di Sekolah Dasar hingga kajian teori grup isometri di perguruan tinggi. Pendekatan ini mendukung tujuan Kurikulum Merdeka dengan mengaitkan pembelajaran matematika pada konteks lokal yang bermakna.

***Kata kunci**: Biklusu; pola frieze; tenun lotis Amanuban; teke; pembelajaran kontekstual.*

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INTRODUCTION

Mathematics is a discipline that emerged from the human need to understand and organize the surrounding world. As a universal science, mathematics has evolved from a simple counting tool into a symbolic system used to recognize patterns, construct structures, and explain relationships between objects in various contexts (Devlin, 2000). However, school mathematics is often taught in an abstract and formalized manner, which can hinder students' comprehension, especially when it lacks meaningful connections to their everyday experiences and sociocultural environment (Freudenthal, 1991; NCTM, 2000).

Culture, on the other hand, is a form of human expression that reflects systems of values, symbols, and social practices passed down through generations. Each community has its way of interpreting and organizing knowledge based on the realities they experience. These practices often involve mathematical principles, whether consciously or unconsciously (Bishop, 1988; Rosa & Orey, 2011). In this context, culture should not merely be seen as a backdrop but as a meaningful and rich source of learning. Therefore, bridging formal mathematics with cultural practices through a more contextual approach such as ethnomathematics becomes important (D'Ambrosio, 2006; Knijnik, 1999).

Ethnomathematics facilitates the understanding that mathematics does not only grow within academic spaces but also exists within the cultural practices of traditional societies. According to D'Ambrosio (2006)), ethnomathematics refers to how non-formal communities classify, structure, and explain their lived experiences using quantitative and spatial reasoning. In this context, works of art such as woven fabrics represent a culturally embedded form of mathematical practice.

Research outside Indonesia has demonstrated the significant potential of ethnomathematics in integrating local culture into the curriculum. Barton (1996) and Gerdes (1999) emphasize that embedding mathematics instruction within cultural contexts enhances both engagement and conceptual relevance for learners. Zaslavsky (1999), drawing from African traditions, illustrated how geometric practices rooted in culture can help students grasp ideas such as symmetry and transformation in meaningful ways.

Research on the mathematical structures embedded in traditional Indonesian woven fabrics has revealed the richness of geometric principles within local motifs. For instance, Radiusman & Juniati (2022) analyzed Lombok weaving patterns using the concepts of frieze and wallpaper groups. Their study found that various motifs could be classified based on the types of isometric transformations they contain, indicating that traditional weaving serves as a visual expression imbued with mathematical value.

Meanwhile, Indriati et al. (2022) examined textile motifs from Siak and identified frieze patterns ranging from types F1 to F7. Their research not only highlighted the symmetrical features of these motifs but also demonstrated how such findings could be applied in mathematics education, particularly in introducing the concepts of transformation and symmetry within a contextual framework. More recently, Nainoe et al. (2024) focused on woven motifs from North Central Timor. Employing group theory, they analyzed the types of symmetries present in these

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patterns and emphasized their potential for developing culturally rooted mathematics learning media. These studies underscore that each weaving tradition possesses unique mathematical characteristics that merit further exploration. In this regard, examining the motifs of *lotis Amanuban* woven fabrics becomes particularly significant as it offers an opportunity to uncover similar potential for enriching culturally grounded mathematics education

Lotis weaving, which originates from the Amanuban region, is a cultural heritage of the Dawan community in South Central Timor Regency. It involves a supplementary weft technique, in which threads such as gold, silver, colored cotton, or synthetic fibers are added to the base weave during the weaving process (UPTD Museum Daerah Propinsi Nusa Tenggara Timur, 2005). In Amanuban society, *lotis* cloth functions not only as traditional attire but also as a marker of social status, an ethnic identity symbol, and a significant component of customary rituals including weddings and funerals. The motifs found in *lotis* weaving carry philosophical values passed down across generations and are marked by distinctive geometric and repetitive patterns. The *teke* (gecko) and *biklusu* (lizard) motifs are among the most significant, as they symbolize purity and honesty in Amanuban cultural belief. (UPTD Museum Daerah Propinsi Nusa Tenggara Timur, 2005).

The actual forms and colors of *teke* and *biklusu* motifs vary significantly, shaped by each weaver's creativity and artistic interpretation rather than by standardized templates. This variation is illustrated in Figure 1.

a) *Teke* motif with white patterns

(b) Interconnected *Teke* motif with orange and white accents

(c) *Biklusu* motif with white patterns

Source: research documentation

Figure 1. Teke and Biklusu Motifs

The linear arrangement of *lotis* motifs, including *teke* and *biklusu*, often displays isometric properties such as translation, reflection, and rotation. These characteristics open up opportunities for analysis based on symmetry group theory, particularly the subgroup known as frieze groups. Frieze groups are one-dimensional symmetry groups that describe repeated patterns along a straight line. According to Umble & Han (2014), frieze patterns can be categorized into seven distinct groups (F1 to F7), each characterized by specific

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combinations of isometric transformations such as translation, vertical and horizontal reflections, 180° rotation, and glide reflection. Identifying frieze patterns in cultural motifs can offer a meaningful way to connect cultural heritage with contemporary mathematics education. This aligns with Gerdes (1999) view that traditional designs can be valuable sources for introducing and exploring mathematical ideas.

Lotis weaving exhibits regional variation across Amanuban, Amanatun, and Mollo, the three major cultural areas in South Central Timor regency, as well as in comparison to other regions such as North Central Timor. Among these, Amanuban motifs tend to exhibit more explicit symmetrical structures and a greater variety of frieze compositions, making them particularly suitable as research subjects for uncovering complex mathematical structures and opening new opportunities for innovation in mathematics instruction.

The Merdeka Curriculum emphasizes the development of student competence in deeply understanding concepts and applying them to real-life contexts (Badan Standar, Kurikulum, dan Asesmen Pendidikan Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi, 2024). To align with this vision, mathematics learning needs to be anchored in meaningful contexts that reflect students' cultural and everyday experiences. Traditional woven motifs, which inherently contain rich geometric structures, offer such a contextual foundation and can serve as effective entry points for exploring abstract mathematical ideas.

Despite this potential, no study to date has specifically focused on Amanuban *lotis* woven fabric as the primary subject for frieze pattern analysis, leaving a significant gap that invites deeper investigation. Given the visual and structural complexity of these motifs, this research introduces a novel approach by exploring the frieze structures in Amanuban *lotis* motifs and assessing their potential integration into mathematics education, particularly in teaching geometric transformations. By combining visual analysis, artisan interviews, and symmetry group theory, this study aims to contribute to both cultural preservation and educational innovation.

The primary objective of this research is to identify the frieze patterns embedded in Amanuban *lotis* woven fabric and evaluate how these patterns can be applied in mathematics education at the school level, especially in topics related to geometric transformations. This approach seeks to make mathematics learning more contextual and enjoyable, while simultaneously fostering a deeper appreciation for the nation's cultural heritage. The outcomes of this study are expected to serve as a valuable instructional resource that can be utilized by mathematics educators in culturally relevant teaching practices.

METHODS

This study adopts a descriptive qualitative approach, focusing on identifying the mathematical structures embedded in the *teke* and *biklusu* motifs of Amanuban *lotis* weaving, specifically their classification as frieze patterns, and examining their potential for integration into mathematics education.

The research was conducted in Amanuban, South Central Timor Regency, East Nusa Tenggara Province, a region known as the origin of *lotis* weaving artisans. Data were collected using three techniques: (1) direct observation of the weaving process and

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the finished woven fabrics, (2) visual documentation through photographs and videos, and (3) semi-structured interviews with local weavers and cultural figures.

Data analysis was carried out in two stages. First, each *teke* and *biklusu* motif was analyzed to identify the type of frieze pattern it represents, based on the seven frieze group classifications (F1-F7) as outlined by Umble & Han (2014). The first pattern, F1, is the simplest, characterized solely by translation without any reflection or rotation, resulting in a one-directional repetition. F2 consists of translation combined with glide reflection, creating a mirrored shift along a horizontal axis. F3 includes translation and vertical reflection, where each unit is the mirror image of the adjacent unit along a vertical axis. F4 combines translation and 180° rotation. F5 features translation, 180° rotation, and vertical reflection, creating a configuration where motifs rotate and align symmetrically. Interestingly, vertical reflection in F5 can also be derived by combining glide reflection and 180° rotation, illustrating the interconnectedness of symmetrical elements. F6 is composed of translation and horizontal reflection, where motif elements are symmetrical along a horizontal line. Finally, F7 is the most complex and symmetrical type, incorporating translation, vertical and horizontal reflection, and 180° rotation, resulting in a highly balanced pattern in both horizontal and vertical directions. All seven frieze types are illustrated in Figure 2.

The identification of frieze pattern types was carried out by visually analyzing all existing motifs to determine whether they exhibited unidirectional translation and were constructed using other isometric transformations. These transformations may include horizontal reflection, vertical reflection, 180° rotation, or glide reflection. Based on this analysis, the specific frieze group present in each woven pattern could be determined (Indriati et al., 2022). The results of this identification were analyzed to assess their pedagogical potential for teaching geometric transformations at various educational levels.

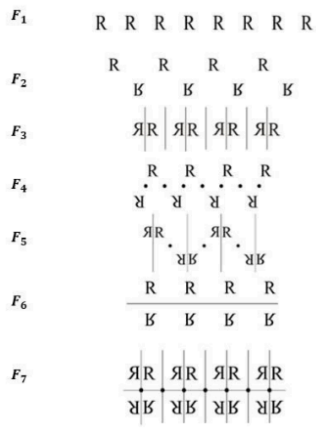

Figure 2. The seven frieze group patterns as classified by Umble & Han (2014)

RESULTS AND DISCUSSION

The decorative motifs of geckos and lizards, locally referred to as *teke* or *biklusu*, represent the lived experiences of Timorese communities. In ancient times, their ancestors dwelled in caves where these animals were frequently observed crawling along the walls. Among the *Dawan* people, geckos and lizards symbolize purity and honesty. It is believed that when a lizard makes a sound during a conversation involving a promise or a truthful statement, it affirms

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the speaker's words. Additionally, the lizard is considered a spiritual intermediary between the living and the ancestral spirits. The gecko is often regarded as a harbinger of future events. Both animals are honored as sacred symbols of the Earth's deity.

Among the various decorative patterns found in the South Central Timor region, motifs of this type are especially prominent in the weaving traditions of Amanatun, Amanuban, and Mollo. Historically, these woven fabrics were reserved for the nobility (*usif*), although they are now worn by all community members (UPTD Museum Daerah Propinsi Nusa Tenggara Timur, 2005).

This study analyzes three variants of *lotis* woven fabrics, each featuring distinct *teke* and *biklusu* motifs (Figure 1), to identify the types of frieze patterns they exhibit. The white *teke* motif shown in Figure 1(a) is a stylized representation of a gecko, repeated horizontally as a fundamental part of the design. In the cultural context of East Nusa Tenggara, the gecko is often viewed as a guardian of the home. Therefore, its appearance in woven fabrics serves not only an ornamental function but also carries symbolic meaning. Visually, the *teke* motif is characterized by an elongated body, laterally extended legs, and a curved tail, all of which facilitate geometric transformation analysis.

Mathematically, this motif illustrates a frieze pattern, which refers to a two-dimensional design that exhibits infinite repetition in a horizontal direction. The first type of isometric transformation identified in this motif is translation, marked by the consistent and parallel repetition of the basic design consisting of two geckos with tails curving downward and upward, extending from left to right without any change in orientation or shape, as illustrated in Figure 3.

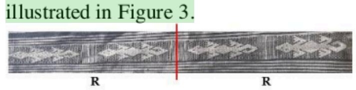

Figure 3. Translation in the White-Patterned *Teke* Motif

Furthermore, the presence of horizontal reflection is discernible in the mirrored arrangement of the gecko's dorsal and ventral sides, most notably in the curvature of the tail, as illustrated in Figure 4.

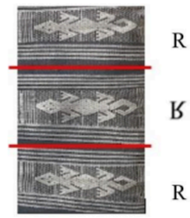

Figure 4. Horizontal Reflection in the White-Patterned *Teke* Motif

However, vertical reflection is absent, since the left and right sides of each gecko are not symmetrical. Likewise, there is no 180° rotation, as all geckos face the same direction and are not arranged in back-to-back positions. A glide reflection is also not present, as there is no combination of reflection and translation in the motif. Given that only translation and horizontal reflection are present, this motif is classified as a Type F6 frieze pattern.

The motif in Figure 1(b) displays a horizontally repeated arrangement of geckos in alternating orange and white bands, positioned alongside other decorative elements. The geckos are depicted with extended bodies and spread limbs, with heads and tails oriented in opposite directions. In cultural terms, the motif retains its symbolic role as a protective element, representing beliefs in balance and protection from harm.

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From a mathematical perspective, the motif exhibits a clear frieze pattern characterized by translational symmetry, as illustrated in the consistent repetition of the basic unit throughout the pattern (refer to Figure 5).

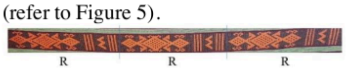
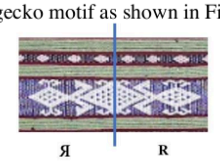
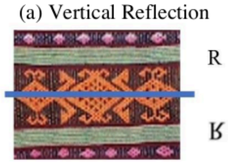


Figure 5. Translation in the Interconnected *Teke* Motif with Orange and White Accents

Vertical reflection is visible, as the left and right sides of each gecko mirror each other across a central vertical axis. Horizontal reflection is also present, given the mirrored top and bottom halves of the gecko motif as shown in Figure 6.



(a) Vertical Reflection



(b) Horizontal Reflection

Figure 6. Reflection on the Interconnected *Teke* Motif with Orange and White Accents

Furthermore, 180° rotation occurs, as pairs of geckos are positioned back-to-back. A 180° rotation about the midpoint between these geckos aligns one with the other as shown in Figure 7. Despite this complexity, glide reflection is not observed.

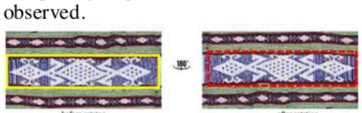


Figure 7. Rotation in the Interconnected *Teke* Motif with Orange and White Accents

With four symmetries present (translation, vertical and horizontal reflection, and rotation), this motif is identified as a Type F7 frieze pattern, the most symmetrical classification among the seven frieze types.

Figure 1(c) presents a motif featuring a small lizard-like figure (*biklusu*), traditionally used in woven fabrics from East Nusa Tenggara. The biklusu has a simpler form than the gecko, with a rounded head and symmetrically extended legs. Repeated horizontally on a red band with gray stripes, the motif forms a strong frieze structure. Culturally, the *biklusu* symbolizes resilience, agility, and adaptability, all of which enrich its philosophical significance in traditional woven fabrics.

Mathematically, the motif clearly exhibits translation, with uniform repetition in one direction as shown in Figure 8.

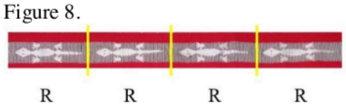


Figure 8. Translation in the Biklusu motif with white patterns

Horizontal reflection is also prominent; the top and bottom halves of the biklusu are mirrored along a central horizontal axis as shown in Figure 9.

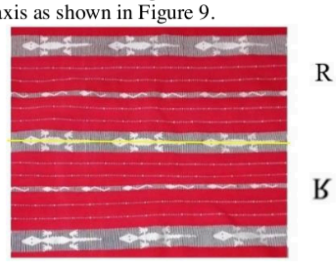


Figure 9. Horizontal reflection in the Biklusu motif with white patterns

However, vertical reflection is not present, as the left and right sides are

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neither identical nor mirrored. There is also no 180° rotation, as all figures face the same direction. Similarly, glide reflection does not occur. With only translation and horizontal reflection, this motif also falls under the Type F6 frieze pattern. Despite its simplicity, it displays a visually harmonious structure that holds educational value in contextual mathematics learning.

These three motifs (two *teke*-based and one *biklusu*-based) demonstrate that traditional weaving designs contain not only cultural and aesthetic value but also exhibit clear mathematical structure in accordance with frieze pattern principles. Each motif presents specific geometric transformations that align with the classification of frieze patterns into seven isometry-based types. The development of group theory and the concept of isometries has played a central role in the history of geometry, shaping the way mathematicians understand symmetry and spatial structure (Coxeter & Greitzer, 1967; Stillwell, 2010).

The first *teke* and *biklusu* motifs both reflect simpler structures that involve translation and horizontal reflection, corresponding to Type F6. These designs nonetheless reveal a strong sense of symmetry and balance. Although relatively simple, they reflect how traditional cultural expressions may embody geometric principles such as symmetry and repetition, regardless of whether they are consciously intended, as suggested in the broader perspective of ethnomathematics (D'Ambrosio, 2006).

In contrast, the second *teke* motif exhibits the most complex symmetry structure, combining translation, vertical and horizontal reflection, and 180° rotation. These elements classify it as a Type F7 frieze pattern, recognized as the most symmetrical of the seven types. Although Darvas (2007) does not specifically discuss frieze pattern classifications, he emphasizes that traditional visual art often embodies fundamental principles of symmetry and balance. These principles are clearly reflected in this motif.

These findings align with the goals of the Merdeka Curriculum, which promotes culturally contextualized learning. The varying degrees of isometric complexity in the three motifs offer transformative opportunities for teaching geometry. By using frieze patterns from *lotis* Amanuban woven fabrics, educators can create learning activities that connect mathematical content with cultural heritage.

The differences among the motifs demonstrate varying levels of geometric transformation. This indicates that the diversity of traditional designs, while rich in symbolism, can also be analyzed using formal mathematical frameworks. This perspective is in line with ethnomathematics, which recognizes cultural practices as meaningful contexts for mathematical exploration (Barton, 2008; D'Ambrosio, 2006).

Moreover, identifying frieze patterns in traditional motifs can support the incorporation of local textiles into math education. Integrating mathematics instruction with local culture, as demonstrated through the Lotis Amanuban motifs, not only facilitates conceptual understanding but also fosters cultural resonance in the classroom. The identification of symmetry and transformation in these traditional designs supports the notion that mathematics can emerge organically from students' own cultural environments. This finding echoes Barton's (1996) and Gerdes' (1999) assertions that cultural contexts enrich

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mathematical meaning-making. Similarly, Zaslavsky's (1999) work reinforces the idea that traditional geometric patterns serve as powerful pedagogical tools, particularly for concepts such as symmetry and transformation.

Through the lens of frieze patterns, the three teke motifs offer valuable opportunities for integrating mathematics learning across all phases of elementary education. At this level, the first gecko motif, which features translational and horizontal reflection symmetries serves as an accessible entry point for introducing basic geometric concepts such as repetition and symmetry.

After observing the teke motif and discussing its repeating structure, students engage with tailored worksheets designed to deepen their understanding through hands-on activities. In Phase A (Grades 1-2), children may complete a coloring activity in which they continue a sequence of gecko motifs using a simple three-color pattern. This reinforces their recognition of visual repetition and supports fine motor development through coloring tasks.

In Phase B (Grades 3-4), worksheets challenge students to extend partially drawn motif strips and describe the pattern using their own words. This phase encourages active rule discovery, helping learners internalize concepts of regularity and orientation within a repeating design.

By Phase C (Grades 5-6), students work with more complex worksheets requiring them to identify and categorize the transformations found within the motif, such as translation or horizontal reflection. They might also be asked to compare different frieze types, developing spatial reasoning and early classification skills.

Across all phases, these structured worksheet activities, introduced after guided visual exploration, foster the development of mathematical thinking through culturally rooted content. This progression aligns with Piaget's (1973) constructivist theory, emphasizing the role of real-world, interactive experiences in building children's conceptual understanding. Furthermore, by embedding cultural heritage in mathematics instruction, students experience learning as both cognitively meaningful and personally relevant.

In junior high school (Fase D of the Merdeka Curriculum), the second gecko motif, featuring both translation and vertical reflection offers meaningful opportunities to explore geometric transformations at a deeper level. After observing the motif, students can be guided to distinguish between horizontal and vertical reflections and identify how the shapes are repeated across a strip. Through these activities, learners develop spatial awareness and begin to describe transformations informally, using everyday language and diagrammatic representations rather than symbolic notation.

For instance, students can be asked to sketch the gecko motif on grid paper and continue the pattern based on their observations. They can mark the line of reflection, indicate the direction of repetition, and discuss whether the gecko figures flip or shift. These tasks help students recognize the characteristics of reflection and translation in a visual and concrete way, aligning with the expected competencies for transformation geometry at this level.

To support deeper understanding, the activity can be conducted in pairs or small groups, where students compare patterns, articulate their thinking, and revise their conclusions based on peer

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out. This collaborative learning process reflects Vygotsky's (1978) concept of the Zone of Proximal Development, in which cognitive growth occurs through interaction with more knowledgeable peers or teachers. Through this culturally contextualized exploration, students not only develop foundational geometric reasoning but also cultivate an appreciation for the mathematical richness within traditional motifs.

At the senior high school level (Fase E of the Merdeka Curriculum), the third gecko motif characterized by the presence of translation, horizontal and vertical reflections, as well as 180° rotation serves as a rich medium for deeper exploration of geometric transformations. After analyzing the motif, students are encouraged to identify and describe the sequence of transformations that occur along the strip. This leads to the construction of transformation tables, where each instance of the motif is matched with the type of transformation it undergoes.

Students can then be guided to compare the three teke motifs systematically and classify the third motif under the F7 category within the frieze pattern classification. This classification task not only enhances their understanding of the composition of transformations and symmetry but also sharpens their ability to reason deductively and recognize underlying mathematical structures.

To further engage students, the learning process can involve structured group discussions, visual modeling using digital tools or manipulatives, and the presentation of their analysis through posters or multimedia formats. These activities support the development of higher-order thinking skills such as analysis, evaluation, and abstraction which are key competencies in Fase E. Moreover, framing these explorations within the cultural context of Timorese weaving helps students see mathematics not just as a theoretical subject, but as a tool for understanding and appreciating cultural heritage. This culturally responsive approach reinforces the relevance and interconnectedness of mathematical ideas in real-world contexts.

At the university level, particularly within mathematics education and ethnomathematics programs, the analysis of the three teke motifs provides a robust framework for exploring abstract mathematical structures such as the group of isometries. Students are guided to identify the types of transformations present in each motif and formalize them using mathematical notation, such as ordered pairs for translations and matrix representations for reflections and rotations. These activities enable learners to analyze how these transformations combine, forming closed systems that can be modeled through group theory.

The learning approach based on the *teke* and *biklusu* motifs is highly relevant to D'Ambrosio's theory of ethnomathematics, which emphasizes the importance of integrating cultural contexts into mathematics education to bridge the gap between formal mathematics and the mathematics embedded in everyday life (D'Ambrosio, 2006). Several studies support this approach. For instance, Barton (2008) demonstrated that incorporating cultural motifs in mathematics instruction helps students understand mathematical language through familiar contexts. Sriraman & English (2010) further argued that integrating visual patterns in learning promotes mathematical modeling and

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creative thinking. These findings are reinforced by Indriati et al. (2022), who concluded that frieze patterns can serve as effective tools for enhancing students' mathematical literacy through culturally grounded approaches. Similarly, Nainoe et al. (2024) found that understanding geometric concepts can be strengthened contextually through traditional motifs. Rusidiatam also concluded that using teaching aids such as Lombok woven fabrics to teach geometric patterns enables students to better recognize their cultural heritage and to see the strong relationship between culture and mathematics, making classroom geometry lessons more engaging.

In summary, the teke and biklusu motifs analyzed in this study highlight the intersection of mathematical reasoning and cultural heritage. These patterns not only support the understanding of geometric transformations but also promote cultural appreciation and contextualize mathematics as a meaningful and relevant discipline.

CONCLUSIONS AND SUGGESTIONS

Based on the analysis of three *lotis* Amanuban woven fabrics motifs featuring geckos and lizards (biklusu), it can be concluded that these designs exhibit a variety of mathematical structures in the form of frieze patterns, each reflecting different levels of symmetry. Two motifs, namely the white gecko and the biklusu, demonstrate translation and horizontal reflection, classifying them as Type F6 frieze patterns. In contrast, the orange and white gecko motif incorporates translation, vertical and horizontal reflection, and 180° rotation, which qualifies it as a Type F7 frieze pattern. These findings indicate that traditional motifs possess not only visual and symbolic richness but also clear mathematical structure.

The implications of these results are significant for mathematics education. Recognizing symmetry and transformation in local motifs provides an effective medium for contextualized learning from elementary to higher education. Each frieze pattern type can be matched with students' cognitive development levels, from simple pattern recognition in primary school to the study of isometry group theory in university courses. This pedagogical approach supports the objectives of the Merdeka Curriculum by embedding mathematical instruction in culturally meaningful contexts.

In light of these findings, it is recommended that further research explore a wider variety of traditional motifs from different regions in Indonesia to identify their potential for mathematics instruction. Educators are encouraged to integrate local textile patterns into geometry lessons, fostering cultural appreciation while enhancing conceptual understanding. Collaborative efforts between mathematics educators and local artisans could also lead to the development of culturally grounded teaching materials that promote both mathematical thinking and cultural identity.

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