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The beauty of mathematics in Indonesian culture: An impactful and meaningful context in number patterns learning

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ABSTRACT

The integration of cultural heritage into mathematics learning remains underexplored, particularly in the context of Indonesian traditional arts. Existing mathematics curricula often overlook the potential of local cultural artifacts to contextualize abstract mathematical concepts. This study addresses this gap by investigating the mathematical structures embedded within Batik Lampung motifs, highlighting their novelty in representing numerical patterns through culturally significant designs. The primary aim of this research is to explore and analyze mathematical pattern concepts—specifically odd and even arithmetic sequences, square numbers, rectangular numbers, and constant sequences—within the *Siger*, *Gajah*, *Pucuk Rebung*, *Sembagi*, and *Kapal* motifs of Batik Lampung, while also uncovering their underlying philosophical meanings. Employing a qualitative ethnographic approach, the study collected data through visual documentation, direct observation, semi-structured interviews, and literature review. The findings reveal the presence of arithmetic sequences, square and rectangular number patterns, and constant sequences, each reflecting cultural values such as sustainable growth, balance, perfection, and continuity. These results underscore the potential of Batik Lampung as a meaningful and contextual medium for mathematics instruction. This study contributes to the development of culturally responsive teaching strategies aimed at enhancing students' mathematical understanding and motivation through the incorporation of local cultural heritage.

INTRODUCTION

Mathematics is frequently perceived by students as an abstract and disconnected discipline, often divorced from everyday experience (Awoniyi et al., 2025; Grootenboer et al., 2023). In contrast, educational theorists assert that mathematics is a product of human activity, inherently embedded in daily life and shaped by cultural and social contexts (Prahmana, 2022). From this perspective, mathematics extends beyond symbolic representations and theoretical constructs; it functions as a practical tool for interpreting real-world phenomena and solving contextual problems (Babu et al., 2023). However, when mathematics is taught in a decontextualized manner, students often struggle to grasp its concepts and fail to see its relevance to their lived experiences (Risdiyanti & Prahmana, 2021). To address this disconnect, it is essential to design instructional strategies that bridge abstract mathematical content with culturally meaningful contexts, thereby promoting deeper understanding and the application of mathematical reasoning in real-life situations.

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Ethnomathematics, as introduced by D'Ambrosio (2016), provides a theoretical and pedagogical framework for contextualizing mathematics within cultural practices. It emphasizes that mathematical knowledge is not culturally neutral but rather emerges from diverse ways of knowing, which are embedded in traditional practices, artifacts, and symbols (Orey & Rosa, 2021; Sudirman et al., 2024). As an instructional approach, ethnomathematics seeks to illuminate how mathematical ideas manifest in local contexts, thereby fostering students' conceptual understanding and cultural appreciation (Prahmana et al., 2023). For example, traditional Indonesian practices such as batik making provide rich opportunities for exploring mathematical concepts, including symmetry, patterns, geometry, and sequences.

Indonesia's cultural diversity offers a fertile ground for ethnomathematical inquiry. As a multicultural and archipelagic nation, Indonesia is home to a vast array of traditional art forms, among which Batik Lampung stands out for its symbolic depth and aesthetic intricacy. This regional batik tradition reflects not only cultural identity but also a variety of mathematical structures embedded within its motifs (Prahmana & D'Ambrosio, 2020). These include concepts such as numerical patterns, geometric transformations, reflectional symmetry, and repetition. The mathematical significance of Batik Lampung positions it as a potential pedagogical tool for constructing culturally grounded mathematics instruction. By leveraging students' socio-cultural backgrounds, educators can enhance mathematical engagement and promote both cognitive and cultural development (Sharma & Orey, 2017).

Previous research has made notable contributions to the ethnomathematical exploration of Lampung culture, including investigations of mathematical elements embedded in *Tapis* cloth and traditional houses (Loviana et al., 2020), traditional games (Merliza, 2021), and traditional cakes (Merliza et al., 2022). In the realm of batik, ethnomathematical inquiries have been conducted by Noerhasmalina and Khasanah (2023), Prahmana and D'Ambrosio (2020), and Sutrisno and Saija (2021), primarily emphasizing geometric shapes and symmetrical patterns. While these studies have deepened the understanding of spatial and visual elements in Batik designs, there remains a notable paucity of research addressing numerical patterns—particularly within the context of Batik Lampung. This represents a critical gap in the literature, as number patterns constitute a fundamental concept in mathematics education and may offer rich insights into the cultural logic embedded in Batik motifs.

To address this underexplored area, the present study aims to investigate the number patterns present in Batik Lampung motifs and examine their philosophical meanings within the Lampung community. Additionally, the study seeks to explore the pedagogical potential of these patterns for integration into mathematics instruction, thereby linking cultural heritage with mathematical learning. Consequently, this research is focused on identifying and describing number patterns in Batik Lampung motifs and analyzing their associated philosophical significance. The findings are expected to contribute to the theoretical discourse on ethnomathematics by expanding its scope beyond geometry into numerical concepts, while also providing practical implications for culturally responsive mathematics education. Therefore, this study is guided by the research question: How are number patterns represented in Batik Lampung motifs, what are their underlying philosophical meanings, and how can they be utilized as instructional resources in mathematics education?

METHODS

This study employed an ethnographic research methodology to examine the cultural practices of the Lampung community, with particular emphasis on the motifs found in Batik Lampung. Situated within the framework of ethnomathematics, the research sought to identify underlying mathematical principles—specifically number patterns—while also exploring the philosophical meanings embedded within these traditional designs. Data were collected through a combination of literature review and semi-structured interviews with purposively selected participants who possess in-depth expertise in Lampung cultural heritage.

The selected informants included Mr. Humaidi, a cultural practitioner and retired civil servant formerly affiliated with the Lampung Cultural Center (*Taman Budaya Lampung*), and Mrs. Zatunutqen, a traditional elder (*Tetua Adat*) holding the honorary title of *tapis*, residing in

Tanggamus Regency, Lampung Province. Mr. Humaidi, a native of Pesawaran Regency, Lampung Province, was raised in a family committed to the preservation of Lampung cultural traditions. Throughout his tenure at the Provincial Cultural Center, he actively contributed to various initiatives aimed at sustaining and promoting local cultural expressions. Meanwhile, Mrs. Zatunutqen, as a respected figure in the community, has played an essential role in transmitting cultural knowledge and philosophical values to younger generations.

Prior to the interviews, informed consent was obtained from both participants, allowing for the disclosure of their identities and the publication of research findings. To ensure the credibility and validity of the data, triangulation was employed by cross-referencing interview results with findings from relevant literature sources.

The primary method of data collection in this study was semi-structured interviews. Unlike fully structured interviews, semi-structured interviews provide enhanced flexibility and adaptability, enabling researchers to adjust the flow of conversation based on contextual developments and to pursue probing questions when necessary. Although the interviews were guided by a predetermined set of questions, this approach allowed for a more interactive and nuanced exchange of information. The interviews were conducted with two key informants—Mr. Humaidi and Mrs. Zatunutqen—both of whom were selected for their recognized authority and deep knowledge of the cultural and mathematical dimensions of Batik Lampung motifs. The interview questions focused on the historical background, the specific motifs, and the embedded philosophical meanings associated with Batik Lampung.

In addition to the interviews, an extensive literature review on Batik Lampung was conducted to enrich and validate the findings obtained from fieldwork. The data collection process was systematically documented through multiple forms of evidence, including photographs, audio recordings of the interviews, and comprehensive notes derived from the literature review. To ensure the credibility and accuracy of the research findings, triangulation techniques were employed by cross-referencing data from interviews with relevant scholarly literature, with particular emphasis on the identification of mathematical concepts—specifically number patterns—and the cultural and philosophical values embedded in Batik Lampung motifs. Furthermore, researcher triangulation was conducted to enhance the validity of the identification of number pattern concepts within the motifs. The final stage of the study involved the analysis and interpretation of the data to generate coherent and contextually grounded insights, focusing on the convergence of findings across multiple data sources and their broader cultural and mathematical significance. The ethnographic procedures followed in this research were adapted from Spradley (2016) and are presented in Table 1.

FINDINGS

The findings of this study identified six distinct Lampung batik motifs that embody mathematical elements and cultural values, making them valuable and meaningful contexts for teaching number patterns. Each motif contains specific mathematical characteristics that can be effectively integrated into mathematics instruction. A detailed explanation of each motif, along with its mathematical and cultural significance, will be presented in the findings section of this article.

The *Lampung* Batik Motifs

In addition to *Tapis*, which is widely recognized as the traditional woven fabric of the Lampung people, another distinctive textile from the region is Batik Lampung. Although both textiles originate from the same cultural context, they differ in terms of production techniques and visual characteristics. *Tapis* motifs are created using hand-embroidered gold thread, whereas Batik Lampung employs the batik technique using hot wax, known as *malam*, to form intricate patterns. Beyond its ceremonial function, Batik Lampung is also adapted for everyday clothing, depending on the garment's design and purpose (Humaidi, 2021).

The historical emergence of Batik Lampung is closely linked to the settlement of Javanese communities in the Lampung region (Zatunutqen, 2022). Budianto (2020) explains that the official migration of Javanese people to Lampung began in 1905 as part of a colonial resettlement program.

Table 1
Ethnographic research stages

Method Stage	Ethnographic Activities
Selecting an ethnographic project	The scope of this ethnographic research focuses on the Lampung Batik Motif.
Asking ethnographic questions	Researchers formulate questions that guide the collection of relevant data, directing what is observed and heard during the research process.
Collecting ethnographic data	Data were collected through various methods, including documentation, observation, interviews, and literature review. Documentation was used to visually capture the Lampung batik motifs for identification purposes. Observations focused on recognizing number patterns represented in the designs. Interviews were conducted with experts in Lampung Batik motif and traditional elders to explore the philosophical meanings behind the motifs. Field notes were taken during the research activities, and a literature review was conducted to analyze written sources related to Lampung batik motifs.
Making an ethnographic record	Researchers recorded ethnographic notes in the form of field notes related to the motifs and documented interview findings.
Analyzing ethnographic data	The data collected were analyzed to explore the mathematical concept of number patterns and the philosophical elements embedded in the Lampung Batik Motif.
Writing the ethnography	The ethnography was written in such a manner that the Lampung batik motifs are presented in detail and with clarity, avoiding generalizations or vague interpretations.

Over time, the Javanese settlers integrated local cultural elements into their practices, leading to the development of Batik Lampung, characterized by motifs that reflect the region's unique cultural identity.

The motifs of Batik Lampung are primarily inspired by traditional ornaments, regional flora and fauna, and iconic cultural accessories associated with the Lampung region. Among the most prominent motifs are *Siger* (a traditional crown symbolizing Lampung nobility), *Kapal* (ship), *Gajah* (elephant), *Kembang Kopi* (coffee flower), *Kacapiring* (gardenia), and *Pucuk Rebung* (bamboo shoot).

The specific motifs analyzed in this study include *Siger* Batik, *Kapal* Batik, *Pucuk Rebung* Batik, *Gajah* Batik, *Sembagi Kacapiring* Batik, and *Sembagi Kembang Kopi* Batik. Furthermore, Figure 1 illustrates the diversity of Batik Lampung motifs, reflecting the region's rich cultural and symbolic heritage. Finally, this study focuses on exploring number pattern concepts embedded within these motifs, with the aim of identifying mathematical structures that can serve as meaningful and culturally relevant contexts for mathematics instruction.

The *Sembagi* Batik Motif

The *Sembagi* motif is recognized as the first officially patented Batik Lampung design. It is characterized by floral strands—particularly coffee flowers (*kembang kopi*)—arranged along the length of the fabric, often combined with culturally significant ornaments such as the elephant (*gajah*), ship (*kapal*), and crown (*siger*). The *Sembagi Kacapiring* variant is traditionally used during *Pepadun* ceremonial rites such as the *Cakak Pepadun* initiation and customary weddings. The *Sembagi* motif reflects a deep appreciation for the natural beauty of Lampung, particularly its renowned coffee, which holds cultural and economic value (Zatunutqen, 2022).

In terms of mathematical structure, the *Sembagi* motif reveals an underlying number pattern that aligns with arithmetic and geometric concepts. The detailed examination of number patterns embedded in the *Sembagi* motif as follows.

The *Siger* Batik Motif

The *Kapal* Batik Motif

The *Pucuk Rebung* Batik Motif

The *Gajah* Batik Motif

The *Sembagi* "*Kacapiring*" Batik Motif

The *Sembagi* "*Kembang Kopi*" Batik Motif

Figure 1. The diversity of Batik Lampung motifs

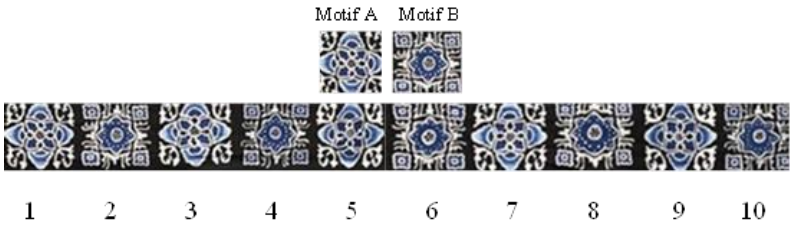

Figure 2. Types of motifs and the sequence of patterns in the *Sembagi "Kembang Kopi"* motif

The Sembagi "Kembang Kopi" Motif

Figure 2 displays two recurring motif patterns labeled as Motif A and Motif B. Motif A follows a numerical sequence: 1, 3, 5, 7, 9, ..., in which each term increases by a constant difference of 2. This represents an arithmetic sequence with a common difference d = 2, beginning at 1. Thus, the general term can be defined as:

$$U_n = 2n - 1 \qquad (1)$$

Motif B presents a sequence: 2, 4, 6, 8, 10, ..., also with a common difference of 2, beginning at 2. Hence, its general formula is:

$$U_n = 2n \qquad (2)$$

Figure 2 also illustrates that these motifs alternate in the batik pattern, creating a systematic interplay between even and odd numbers. Motif A represents the odd-number sequence, while Motif B corresponds to the even-number sequence. This alternating pattern enables predictions about large numbers; for instance, the number 100 would fall under Motif B (even), whereas 1001 corresponds to Motif A (odd).

The Sembagi "Kacapiring" Motif

Figure 3 highlights the presence of square number patterns in the *Sembagi* motif. These are derived by squaring positive integers:

$$1^2 = 1, 2^2 = 4, 3^2 = 9, 4^2 = 16, \ldots$$

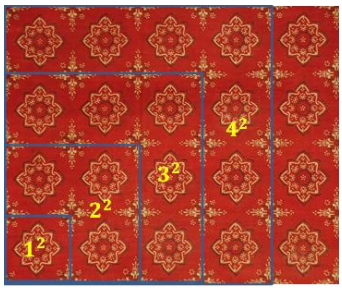

Figure 3. Representation of square patterns (perfect squares) in the *Sembagi* motif

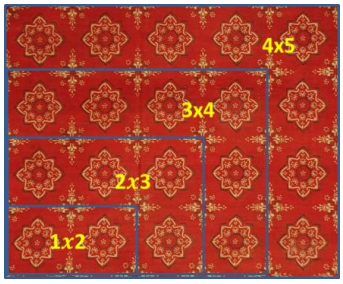

Figure 4. Representation of rectangular patterns in the *Sembagi* motif

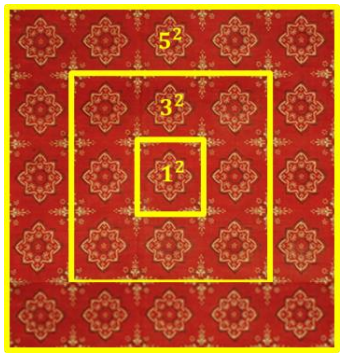

Figure 5. Representation of odd-number squares patterns in the *Sembagi* motif

These perfect squares not only reflect areas of squares with corresponding side lengths but also symbolize order and symmetry within Lampung's cultural geometry.

Furthermore, Figure 4 demonstrates rectangular number patterns in the motif, generated from sequential multiplication of consecutive integers:

$$1 \times 2 = 2, 2 \times 3 = 6, 3 \times 4 = 12, 4 \times 5 = 20, \ldots$$

This sequence aligns with the formula for the *n-th* term:

$$U_n = n(n+1) \qquad (3)$$

These rectangular numbers are visually and mathematically embedded into the motif's layout, showcasing a harmonious integration of mathematical logic into traditional aesthetics.

Finally, Figure 5 presents a sequence of numbers: 1, 9, 25, 49, ..., which can be interpreted as the squares of odd integers:

$$1^2 = 1, 3^2 = 9, 5^2 = 25, 7^2 = 49, \ldots$$

This pattern follows the general term:

$$U_n = (2n-1)^2 \qquad (4)$$

This formula reveals the aesthetic encoding of odd-number squares in the motif, illustrating a unique representation of geometric growth within the visual structure of *Sembagi* Batik. These findings emphasize the potential of Batik Lampung motifs, particularly *Sembagi*, as culturally relevant and mathematically rich contexts for number pattern learning in mathematics education.

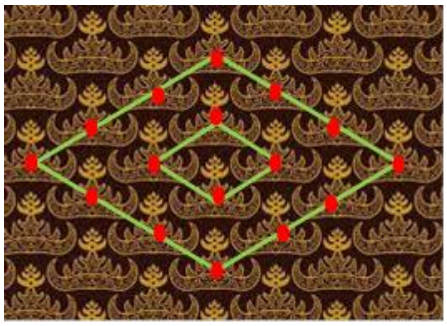

Figure 6. Representation of number patterns in the *Siger* Batik Motif

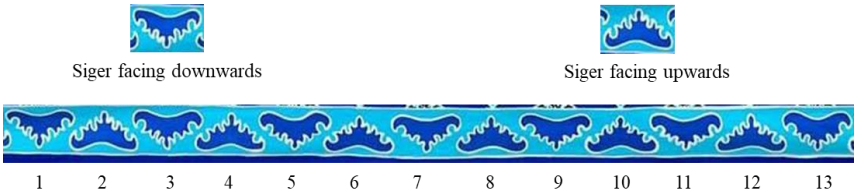

Figure 7. Types of motifs and sequence patterns in the *Siger* Batik Motif

The *Siger* Batik Motif

The *Siger* is a traditional crown that symbolizes dignity, nobility, and cultural identity among the Lampung people of Indonesia. It is customarily worn by women during ceremonial and traditional events. The design of the *Siger* features two types of curved peaks: seven peaks are characteristic of the *Saibatin* sub-ethnic group, while nine peaks represent the *Pepadun* sub-ethnic group. These variations are not merely decorative but serve as symbolic representations of familial lineage and noble titles within the Lampung community.

Mathematically, the *Siger* batik motif provides an ethnomathematical context through which learners can explore number patterns embedded within its geometric design. Figure 6 presents a numerical pattern derived from the geometric arrangement of *Sembagi* motifs, which consist of a series of repeated *Siger* elements. The sequence formed by the number of elements in each row is: 4, 12, 20, 28, and so on. By observing the differences between successive terms (e.g., 12 – 4 = 8; 20 – 12 = 8; 28 – 20 = 8), it becomes evident that the pattern follows an arithmetic progression with a common difference b = 8 and an initial term a = 4. Consequently, the general formula for the *n-th* term can be expressed as:

$$U_n = 8n - 4 \qquad (5)$$

This sequence reflects a unique geometrical structure within the *Siger* motif, showcasing how cultural elements can be interpreted through mathematical representations.

Further exploration of Figure 7 reveals different numerical patterns based on the orientation of the *Siger* elements. When the *Siger* motifs are oriented downward, they form a sequence of: 1, 3, 4, 5, 7, 9, and so on. Aligning this with an arithmetic progression, and assuming a consistent difference of 2, the general formula for the *n-th* term in the sequence can be approximated by:

$$U_n = 2n - 1 \qquad (6)$$

Conversely, upward-facing *Siger* motifs generate a sequence of even numbers: 2, 4, 6, 8, 10, 12, etc., which follows a standard arithmetic sequence with a difference of 2. The corresponding general term is:

$$U_n = 2n \qquad (7)$$

Figure 8 further illustrates a sequence beginning with zero, incorporating both motif orientations. In this context, the upward-facing *Siger* motifs form a sequence of odd numbers, while the downward-facing motifs correspond to even numbers. This distinction provides a meaningful pedagogical tool, demonstrating how traditional batik patterns can be used to introduce students to

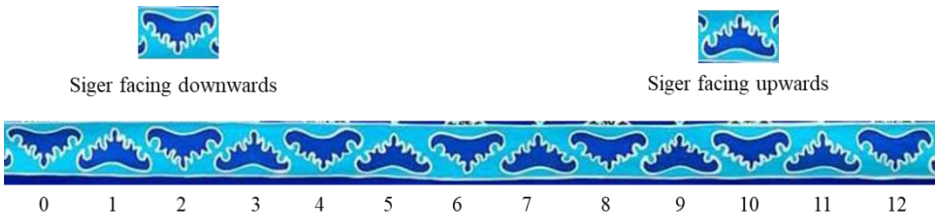

Figure 8. Motif types and sequence arrangements in the *Siger* Batik Pattern

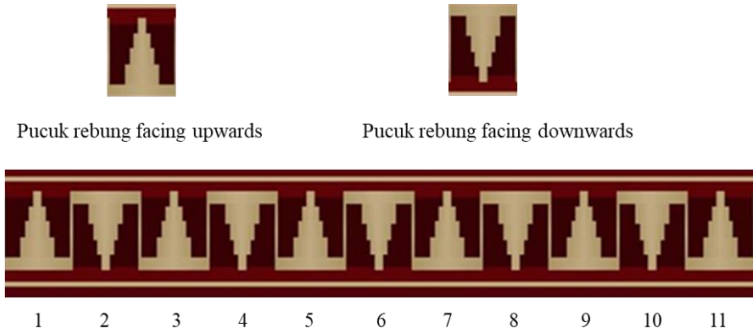

Figure 9. Types of motifs and sequence patterns in the *Pucuk Rebung* Batik design

arithmetic sequences, pattern recognition, and mathematical abstraction within culturally relevant learning environments.

The *Pucuk Rebung* Batik Motif

The *Pucuk Rebung* motif is a distinctive element frequently found in *tapis*, a traditional woven cloth native to the Lampung region of Indonesia. This motif carries profound cultural meaning and reflects the philosophical values embedded in *Piil Pesenggiri*, the traditional code of conduct of the Lampung people. Furthermore, Zatunutqen (2022) explains that the *Pucuk Rebung* motif symbolizes key communal values such as kinship, unity, mutual cooperation, empathy, and collective responsibility, which are integral to the Lampung identity.

Figure 9 illustrates the numerical patterns derived from the geometric arrangement of the *Pucuk Rebung* motif. When the motifs are oriented upwards, they form the sequence 1, 3, 4, 5, 7, 9, and so on. By examining this sequence, and assuming a consistent difference of 2 between terms, it approximates an arithmetic progression, where the general formula for the *n-th* term is given by:

$$U_n = 2n - 1 \qquad (8)$$

This pattern represents the sequence of odd numbers and highlights the structural regularity within the motif's upward orientation. Conversely, when the *Pucuk Rebung* motifs are oriented downward, the numerical pattern observed is: 2, 4, 6, 8, 10, 12, etc. This clearly follows an arithmetic sequence of even numbers with a common difference of 2. The corresponding general formula for the *n-th* term is:

$$U_n = 2n \qquad (9)$$

If the numerical sequence begins from zero (0), then the resulting pattern consists of alternating even and odd numbers, depending on the orientation of the motif. These number patterns embedded in the *Pucuk Rebung* batik motif not only serve as cultural expressions but also offer pedagogical value for introducing mathematical concepts such as sequences, arithmetic progression, and pattern recognition within a culturally contextualized learning environment. This integration of cultural heritage into mathematics education exemplifies the principles of ethnomathematics, fostering relevance and engagement among learners.

Figure 10. Representation of numerical patterns in the *Kapal* Motif

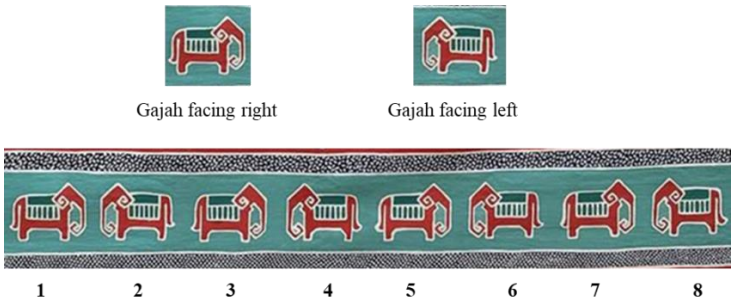

Figure 11. Types of motifs and pattern sequences in the *Gajah* Motif

The *Kapal* Batik Motif

The *Kapal* (ship) motif symbolizes the life and livelihood of fishermen in the Lampung region. This representation is grounded in the geographic context of the province, where the southern and eastern areas are bordered by seas and major rivers. The *Kapal* batik motif, also referred to as Jung, reflects the openness of the Lampung people to interactions with outsiders. Additionally, the symmetrical form of the ship motif conveys a philosophical representation of balance and harmony (Humaidi, 2021; Zatunutqen, 2022). In traditional *Kapal* batik patterns, the ships are typically arranged in a linear sequence with uniform spacing.

As illustrated in Figure 10, the repetition of ship elements occurs with a constant number of units in each motif segment. This repetition forms a numerical pattern that can be interpreted as a constant sequence, where every term holds an identical value. From a mathematical perspective, such a sequence is categorized as an arithmetic sequence with a common difference of zero. The regularity observed in this repetition reflects a controlled visual aesthetic, contributing to the cultural and artistic value of *Kapal* batik within the broader context of Lampung's textile heritage.

The *Gajah* Batik Motif

The *Gajah* motif draws inspiration from the elephant, a symbolic and iconic animal closely associated with Lampung Province. This design is derived from the regional presence of elephants and holds deep cultural significance within the Lampung community. In local philosophical tradition, the elephant represents wisdom and the ability to overcome challenges (Zatunutqen, 2022). The mathematical analysis of this motif reveals distinct numerical patterns embedded in its visual structure.

As observed in Figure 11, elephants oriented to the right follow the numerical sequence 1, 3, 4, 5, 7, 9, and so forth. This sequence, when aligned with the structure of an arithmetic sequence with a common difference of 2, can be generalized by the formula,

$$U_n = 2n - 1 \qquad (10),$$

which characterizes the odd number sequence.

Meanwhile, the elephants facing left exhibit the sequence 2, 4, 6, 8, 10, 12, etc., corresponding to the formula,

$$U_n = 2n \qquad (11),$$

which defines the even number sequence. Furthermore, if the sequence begins with the value zero (0), the motif simultaneously represents both even and odd number patterns. These numerical configurations demonstrate the presence of structured mathematical concepts—specifically arithmetic sequences—within the traditional aesthetic of the *Gajah* motif, reflecting the integration of mathematical thinking in indigenous cultural expressions.

DISCUSSION

Ethnomathematics emphasizes the integration of mathematical concepts with the cultural practices of specific communities, aiming to bridge formal mathematics education with students' lived experiences. This approach situates mathematics as a culturally embedded discipline rather than a purely abstract and universal body of knowledge. Numerous studies have demonstrated the efficacy of ethnomathematics in fostering students' mathematical reasoning and engagement (Maidiyah et al., 2023; Novitasari et al., 2024). By connecting mathematical instruction with culturally familiar contexts, learners are better equipped to internalize abstract concepts, thereby enriching their conceptual understanding and critical thinking skills.

The use of cultural artifacts, such as batik—an Indonesian traditional textile art—offers a pedagogically rich medium for contextualizing mathematical instruction. As highlighted by prior research (Ishartono & Ningtyas, 2021; Prahmana & D'Ambrosio, 2020; Rizqoh et al., 2024), batik patterns reflect various mathematical ideas, including symmetry, transformations, and arithmetic sequences. When incorporated into classroom activities, such artifacts not only facilitate more meaningful and realistic learning experiences but also promote cultural awareness and identity among students (Sugiarto et al., 2025). The aesthetic and repetitive characteristics of batik designs naturally align with mathematical patterns, making them an effective entry point for engaging learners in mathematical discourse.

One mathematical structure frequently observed in batik is the arithmetic sequence, which appears as regular, linear progressions in the visual repetition of motifs. For instance, artisans often employ simple arithmetic rules to generate symmetrical patterns that evolve in a systematic manner. These numerical patterns signify more than mathematical properties; they embody philosophical meanings within traditional culture. Previous studies have identified arithmetic sequences in various batik motifs, including *Kawung* from Yogyakarta (Safitri et al., 2022), *Adipuro* (Astuti et al., 2019), and *Truntum* (Nurcahyo et al., 2024). The use of constant numerical intervals symbolizes concepts such as loyalty, continuity, and unity—values that underscore the community's commitment to cultural preservation across generations.

Beyond their mathematical representation, the numerical elements in batik possess deep symbolic and cosmological interpretations (Putri et al., 2024). For example, patterns involving odd and even numbers are often employed to convey balance, harmony, and complementarity—principles that resonate with traditional worldviews regarding the natural order. These embedded numerical arrangements reflect how local communities perceive and maintain equilibrium within nature and social life. Understanding the underlying philosophy of these numerical patterns enables students to appreciate the cultural significance of batik beyond its visual appeal (Wesnina et al., 2025). It also fosters an integrative learning experience that combines mathematical literacy with cultural sensitivity and philosophical reflection.

The findings of this study indicate that the arithmetic patterns embedded in Batik Lampung possess substantial pedagogical potential and can serve as effective instructional resources in mathematics education. Integrating Batik Lampung as a contextual medium offers opportunities to make mathematics learning more engaging, meaningful, and culturally relevant, particularly in regions where this cultural heritage is prevalent. The ethnomathematical analysis of number patterns within Batik Lampung motifs can be utilized as a foundation for designing instructional materials aligned with realistic and context-based learning approaches (Sari et al., 2023). However, the present study is limited to the identification and analysis of numerical patterns within the motifs and does not extend to the implementation phase. Therefore, future research should focus on the practical application of batik-based instructional models in classroom settings to evaluate their impact on students' conceptual understanding and motivation. Further investigations may also explore interdisciplinary linkages that connect mathematics with local culture, art, and history, thereby advancing culturally responsive pedagogies and enriching the broader educational landscape.

CONCLUSIONS

This study has successfully uncovered and analyzed a range of mathematical patterns inherent in the traditional motifs of Batik Lampung. The identified patterns include odd and even arithmetic sequences, special arithmetic progressions present in the *Siger* motif, square and rectangular number configurations in the *Sembagi "Kacapiring"* motif, and constant numerical sequences in the *Kapal* motif. Each of these patterns reflects not only mathematical structures but also embodies philosophical meanings grounded in the local cultural context, such as continuity, cosmological balance, sustainable growth, and harmony. These findings demonstrate the potential of Batik Lampung as a culturally rich and mathematically meaningful context for introducing abstract mathematical concepts through culturally relevant instruction.

Despite offering a comprehensive descriptive mapping of number patterns and their cultural significance, the scope of this research remains limited to qualitative analysis and motif exploration. The study did not include empirical testing or quantitative validation of the instructional effectiveness of these ethnomathematical elements in real classroom settings. As such, while the results provide a strong theoretical foundation for culturally contextualized mathematics education, they do not yet establish the efficacy of Batik Lampung-based learning materials in enhancing students' mathematical understanding, reasoning, or motivation.

To advance the field, future research should focus on the development and experimental implementation of instructional models that integrate Batik Lampung into mathematics teaching. This includes designing lesson plans, teaching aids, and learning activities rooted in ethnomathematical principles, followed by quantitative evaluations through classroom trials. Such studies could examine the impact of culturally contextualized learning on students' cognitive and affective outcomes, as well as its role in preserving and promoting local cultural heritage within formal education. Expanding this research into interdisciplinary domains may also yield valuable insights into how mathematics education can serve as a bridge between cultural identity and academic learning.

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