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Ethnomathematical Exploration of Cultural Artifacts as a Local Wisdom-Based Learning Resource in Tarakan City

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Abstract

This research aims to explore ethnomathematics in artifacts found in the Tarakan City History Museum. The focus of the research includes the identification of artifacts that contain ethnomathematical elements and the identification of mathematical concepts and principles contained in the artifacts. This research uses a qualitative method with an ethnographic approach. Data was collected through observation, interviews, and documentation. The research informants consisted of the Head of the Tarakan City History Museum and museum officers. Data analysis was carried out through the stages of data reduction, data presentation, and conclusion drawn. The results of the study showed that there were seven artifacts that contained ethnomathematical elements, namely Bebingon, Bubu Kanon, Bintul/Ambau, Telipos, Babun, and Tar. The ethnomathematical elements in the artifacts were reflected in the shape, pattern, size, and structure of the artifacts. The mathematical concepts found include circles, tubes, cones, cones, beams, rectangles, rhombosis, triangles, curved lines, patterns, and symmetry. The mathematical principles found include the regularity of patterns, size relationships, similarity, and balance of shapes. The findings of the study show that the artifacts of the Tarakan City History Museum not only have cultural and historical value, but also contain mathematical concepts and principles that develop in the lives of the Tidung people. The artifacts have the potential to be a source of culture-

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based mathematics learning.

Keywords: Ethnomathematics, Cultural artifacts, Tarakan City History Museum, Mathematical concepts, Mathematical principles.

INTRODUCTION

Education in the modern era plays a strategic role in the formation of human resources who are competitive, characterful, and able to think critically, logically, and reflectively. One of the disciplines that has a fundamental contribution in training these thinking skills is mathematics. However, formal mathematics learning at the school level until now is often perceived as an abstract, difficult to understand, and isolated subject from the reality of life. This gap is generally rooted in instructional transmission that is rigid in procedural orientation and minimally relates teaching materials to the socio-cultural context in the student environment. Therefore, integrating cultural aspects into mathematics pedagogy is an important need to provide meaningful and contextual learning.

The theoretical and practical bridges that connect mathematics with cultural dimensions are studied through the realm of ethnomathematics. The term ethnomathematics was first popularized by Ubiratan D'Ambrosio in 1985 to reflect the specific ways practiced by certain cultural groups in understanding, articulating, and managing their environment through mathematical ideas. This concept emphasizes that mathematics is dynamic and rooted in human anthropological activities. According to Rosa and Orey (2016), ethnomathematics includes methods or techniques (tics) developed by community groups (ethno) in understanding reality (mathema). Fundamental activities such as counting, measuring, designing, building, determining positions, and playing developed from generation to generation in response to the fulfillment of daily life needs.

One form of cultural material that is loaded with mathematical manifestations is artifacts. Artifacts are not simply positioned as relics of the past or material products, but rather representations of technological intelligence, technical skills, and knowledge systems of the people who make them (Koentjaraningrat, 2009; Renfrew & Bahn, 2018). Various material culture products have been proven to contain fundamental mathematical concepts, such as geometry, repetition patterns, symmetry, and spatial comparison (Gerdes, 1994; Rosa & Orey, 2011). In fact, the use of local cultural artifacts as a medium and source of mathematics learning has been proven effective in strengthening students' mathematical literacy (Meilina & Marsigit, 2025). Efforts to

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preserve cultural artifacts are generally gathered in museum institutions that carry out the mandate of preservation, research, and education for the public.

Ethnomathematical studies on artifacts and museum collections have been widely explored by previous researchers. For example, research by Hardiarti (2017) found the application of flat building geometry in the construction of Bugis traditional houses. An investigation into museum collections was also carried out by Rahmadani et al. (2024) at the Langkat Regency Regional Museum which revealed the existence of the concepts of geometry, measurement, and symmetry. Similar findings were reported by Hidayati and Kusno (2024) at the Soesilo Soedarman Museum Cilacap related to the principles of coexistence and spatial geometry, and Herdiyanti et al. (2024) on miniature artifacts of traditional houses and Malay musical instruments at the North Sumatra Museum. However, most previous studies have tended to limit the analysis to the level of identification of surface geometry forms separately, and have not explored in depth the relationship between mathematical concepts and their constituent rules in the perspective of Gagné's theory of learning (Bell-Gredler, 1986).

Specifically, the cultural heritage of the Tidung people in the North Kalimantan region that is stored in a representative manner at the Tarakan City History Museum has never been comprehensively studied through an ethnomathematical lens. In fact, ethnographic collections such as traditional agricultural equipment (Bebingon, Tempinak), aquatic fishing equipment (Bubu Kanon, Bintul/Ambau), trap cages (Telipos), and membranophone musical instruments (Babun, Tar) have design complexity, symmetrical repeatability, and high mathematical proportions. The absence of scientific documentation on ethnomathematics on Tidung artifacts in this museum creates a real research gap amid the urgency of developing contextual teaching materials based on North Kalimantan's local wisdom.

Based on these gaps, this study aims to explore ethnomathematics in artifacts of the Tarakan City History Museum. The main focus of this study is directed to: (1) identification of cultural artifacts that contain ethnomathematical elements; (2) description of mathematical concepts (especially flat buildings, spatial structures, patterns, and symmetry) that are manifested in the structure of artifacts; and (3) the disclosure of mathematical principles that underlie the relationship between size, pattern order, and interbuilding relationships in these artifacts. This research is expected to make a theoretical contribution to the expansion of the archipelago's ethnomathematical database, as well as provide practical implications as a reference for designing contextual mathematics learning resources for educators and museum managers.

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METHOD

Research Design

This research uses an exploratory qualitative approach with an ethnographic design to reveal the natural relationship between culture and mathematics (ethnomathematics). The exploratory qualitative approach was chosen because the researcher aims to explore in depth cultural phenomena that have not been widely documented in the scientific literature, where the researcher acts as a key instrument (human instrument). Through an ethnographic framework, the analysis is focused on the interpretation of socio-cultural meaning and the transmission of geometric knowledge manifested in the material artifacts of the local community. The research was carried out at the Tidung Traditional and Cultural Center and the Tarakan City History Museum located on Jalan Sei Kapuas, Sport Centre Complex, Kampung Empat Village, East Tarakan District, Tarakan City, North Kalimantan Province.

Subjects and Objects of Research

The object of this study is the cultural artifacts of the Tidung tribe in the collection of the Tarakan City History Museum. The determination of artifact samples was carried out through purposive sampling techniques with the following criteria: (1) they are original ethnographic artifacts of the Tidung people; and (2) have visual, structural, pattern, or proportional dimensions characteristics that indicate a relationship with mathematical concepts and principles. Based on these criteria, 7 (seven) artifacts were determined as the main object of study, namely Bebingon, Bubu Kanon, Bintul/Ambau, Telipos, Tempinak, Babun, and Tar.

Meanwhile, the research subjects (informants) were determined to provide a qualitative context for the observed artifacts (Moleong, 2017). The main informants consisted of the Head of the Tidung Traditional Center and the Tarakan City History Museum as well as guides/museum officers who mastered the nomenclature, history, practical functions, and manufacturing process of these objects.

Data Collection Techniques and Instruments

The research data was collected through a combination of three main techniques in natural conditions:

1. Direct Observation: In-depth physical observation of the morphology of each artifact was carried out using an observation guideline. Observations focused on geometric dimensions

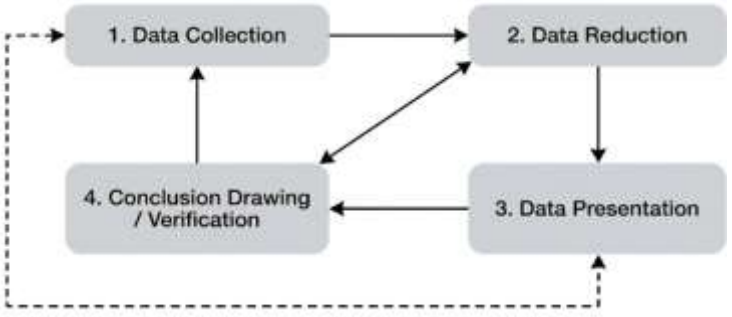
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(flat build and space building), webbing or mesh configuration, proportion ratio, pattern regularity, and symmetry lines.

2. Semi-Structured Interview: In-depth questions and answers were conducted on the research subjects guided by the interview protocol. Semi-structured interviews were applied to explore the flexibility of the informant's perspective regarding the philosophy, usability function, and historical background of the artifact (Esterberg, 2002).
3. Visual Documentation: Capture high-resolution visual recordings (photos from orthogonal angles/projections of top, side, and perspective view) and field notes to support the process of geometric deconstruction analysis.

Data Analysis Techniques

Data analysis was carried out interactively and repeatedly referring to the Miles, Huberman, and Saldaña (2014) model which includes the following stages:



1. Data Collection: Collect all visual observations, artifact photos, voice recordings, and verbatim transcripts of interviews.
2. Data Reduction: Abstracting and filtering raw data into thematic categories; identifying form elements, setting aside irrelevant information, and classifying artifacts into a taxonomy of mathematical concepts (geometry, patterns, symmetry) and mathematical principles (relationship of size, cohesion, and structural order) referring to Gagné's framework of learning objects (Bell-Gredler, 1986).
3. Data Display: Presents structured data through a comparison matrix, summary tables of mathematical concepts, descriptive narrative descriptions, and geometric illustration mapping on artifact photographs.

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4. Conclusion Drawing/Verification: Formulate generalizations of ethnomathematical linkages to artifacts of the Tidung community and re-verify the consistency of findings against physical evidence and informant narratives.

Data Validity Test

The trustworthiness and validity of research findings were tested using triangulation techniques (Sugiyono, 2022):

1. Source Triangulation: Compare and confirm the consistency of oral information between the narration of the Head of the Museum UPT, the explanation of the museum guide, and the ethnographic literature of the Tidung community.
2. Triangulation Technique: Verifying the suitability between direct visual observation data (observation), description of the function and context of the creation (interview), and physical evidence of artifact details (photo documentation and field notes).

RESULTS AND DISCUSSION

This study identified ethnomathematical elements in the artifacts of the Tarakan City History Museum through visual observation and interviews with museum managers. A total of seven artifacts were selected because they contained clear geometric and structural characteristics, including Bebingon, Bubu Kanon, Bintul/Ambau, Telipos, Babun, and Tar. The analysis of the research results was presented systematically including the identification of artifacts, mathematical concepts (flat buildings, spatial structures, and patterns), as well as the principles of regularity and the accompanying size relationships.

Identification of Artifacts Containing Ethnomathematical Elements

The artifacts that became the object of research were selected based on their suitability with the focus of the research, namely artifacts that have the potential to contain ethnomathematical elements. The selection of artifacts was carried out through initial observation of the collection of the Tarakan City History Museum by considering the shape, size, pattern, structure, and other characteristics that have the potential to contain mathematical concepts and principles. Based on the results of the initial observation of the Tarakan City History Museum collection, not all artifacts were used as research objects. The selection of artifacts was carried out by considering the shape, pattern, size, and structure that have the potential to contain ethnomathematical elements. From the results of these observations, seven artifacts were

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obtained that met the research criteria, namely Bebingon, Bubu Kanon, Bintul/Ambau, Telipos, Babun, and Tar. The seven artifacts were then identified to find the mathematical concepts and mathematical principles contained in each artifact.

Table 1. Artifacts Containing Ethnomathematical Elements at the Tarakan City History Museum

Number	Artifact Name	Artifact Uses	Parts of Observed Artifacts	Characteristics of Observed Artifacts
1.	Bebingon	To take and store old rice	Mouth, body, and webbing	Has a geometric shape and a repetitive webbing arrangement
2.	Bubu Canon	Traditional river fishing gear	Body, ends, and webbing	Has a geometric shape and a repetitive webbing arrangement
3.	Sontul/Ambau	Traditional crab trap tools	Frame and mesh	Has a repetitive shape and arrangement of the net
4.	Telipos	Bird breeding tools	Frame and cage blades	Has a geometric shape and an orderly frame arrangement
5	Baboon	Traditional musical instruments	Surface and body of the instrument	Has a geometric shape and balanced structure
6	Tar	Traditional musical instruments	Surface and body of the instrument	Has a geometric shape and proportional size

Mathematical Concepts in Artifacts of the Tarakan City History Museum

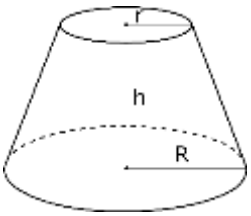
Based on the results of the analysis, it was found that the artifacts that were the object of research contained various mathematical concepts. These concepts included geometry, pattern, and symmetry. The geometric concepts found consisted of flat shapes and spatial shapes, while the concepts of patterns and symmetry were identified based on the characteristics of the shape and arrangement of the artifact parts. Furthermore, the mathematical concepts in each artifact were explained in detail based on the results of observation and analysis. The following are the

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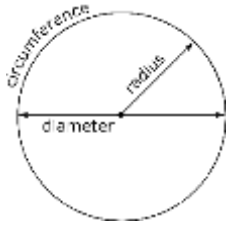
mathematical concepts found in the artifacts of the Tarakan city history museum:

1. Bebigon

Bebingon is a traditional container of the Tidung people to harvest and store old rice that contains the integration of geometric concepts and patterns. The opening of the mouth represents the concept of a circular flat building, while its curved and narrowed body towards the base indicates the building of a conical space being skewed. In addition, the arrangement of bamboo blades that repeatedly cross each other on the weaving shows the application of the concept of geometric patterns and orderliness.



Pict 1. Stumped Cone



Pict 2. Circle



Pict 3. Artifact Bebingon
Source: Personal Documentation

a) Stumped Cone

A cone of a cone is a three-dimensional spatial structure obtained when a cone is cut by a plane parallel to the base so that the top of the cone is separated. A cone is a spatial structure obtained from the cutting of a cone by a plane parallel to the base (OpenStax, 2022). This build has two parallel circular planes, namely the base circle and the top circle, with different radius sizes and connected by curved sides (blankets).

b) Circle

A circle is a set of all points on a plane that have the same distance from a fixed point called a center point. According to (OpenStax, 2022) a circle is one of the flat shapes that has the property that each point in its circumference is the same distance from the center point. These distances are called radius of a circle. This definition is the basis for studying the properties of circles, such as diameter, circumference, and area.

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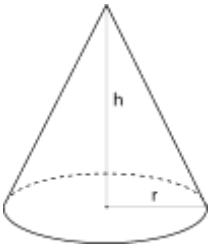
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2. Bubu Kanon

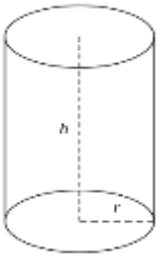
Bubu Kanon is a traditional fishing tool used by the Tidung people. This artifact is made of woven rattan or bamboo which is arranged to form a fish trap. The shape of the artifact is designed in such a way that fish can enter the trap, but it is difficult to get out again. Based on the results of observations, bubu contains several mathematical concepts, namely the concepts of cones, tubes, circles, and patterns.



Pict 4. Artifact Bubu Cannon
Source: Personal Documentation



Pict 5. Cone



Pict 6. Tubes

a) Cone

A cone is a curved side space that has one circular base and one peak point. A cone blanket is a curved plane that connects all points around the perimeter of the base with the peak point. According to (Ministry of Education and Culture, 2021) a cone is a three-dimensional space that has one circular base and one curved side that meets at one peak point. The concept of a cone can be seen on the front of the bubu which is pointed in shape. This part has a circular base and is getting smaller towards the end so that it resembles a cone room building. This shape is used by the community as an entrance to fish so that fish can enter the trap, but it is difficult to get out again.

b) Tubes

A tube is a curved side space that is bounded by two parallel and congruent circular planes, namely as a base and lid, and one curved side called a tube blanket. The distance between the base and the lid is called the height of the tube. This space building has a circular cross-section of the same size on each part along its height (Ministry of Education, Culture, Research, and Technology, 2021). The concept of a tube is seen on the body of the bubu which has an elongated shape with a relatively similar diameter. This part resembles a tube because it has two parallel circular planes and curved sides as a tube blanket. The shape functions as a space where fish are

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trapped after entering through the front of the bubu.

c) Circle

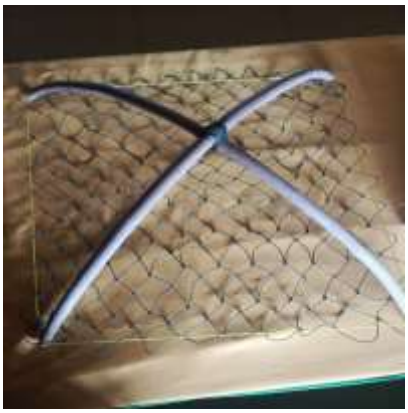
The concept of a circle can be seen in the opening at the back of the bubu. The opening is circular because it has points on the circumference that are relatively equal to the central point. This circular shape facilitates the manufacturing process and provides enough space for capturing and maintaining the bubu.

d) Pattern

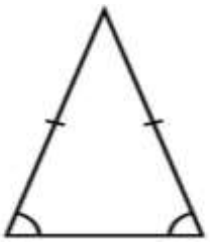
The pattern concept can be seen in the arrangement of woven bamboo that is arranged repeatedly and regularly throughout the surface of the bubu. The bamboo blades are arranged at relatively equal distances so that they form a consistent geometric pattern. The woven pattern not only provides aesthetic value, but also results in a construction that is strong, flexible, and able to withstand pressure when used in water.

3. Bintul/ Ambau

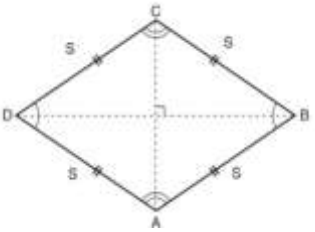
Bintul or Ambau is a traditional trap tool used by the Tidung Tribe to catch crabs in mangrove forest areas and coastal areas. This artifact is made from bamboo or rattan combined with nets. The shape of the artifact is designed in such a way that it can be used as an effective crab trap. In addition to having a practical function, Bintul/Ambau also shows ethnomathematical elements that are reflected in the shape and arrangement of the artifact parts.



Pict 7. Bintul/ Ambau



Pict 8. Triangle



Pict 9. Split Ketupat

a) Triangle

A triangle is a flat structure formed by three lines that intersect at three corner points to form a closed area. A triangle has three sides, three corners, and the largest number of the three

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inner corners is 180° (Ministry of Education, Culture, Research, and Technology, 2021). The concept of a triangle can be seen in a bamboo frame that is arranged intersectingly so that it forms two triangular planes. The arrangement of the frame provides strength and stability to the net when used to catch fish.

b) Line Concept

The concept of lines can be seen on bamboo stems as the main frame and elongated ropes of the net. The lines intersect and form a plane of net resulting in a sturdy construction.

c) Split Ketupat

Rhombus is a rectangular flat building that has four sides of equal length and two pairs of sides that are parallel to each other. This building has two diagonals that intersect perpendicular to each other, divide each other in half of equal length, and divide the corners into two equally large parts (Ministry of Education, Culture, Research, and Technology, 2021). The concept of rhombus is seen in the holes of the net formed from woven rope. Each hole resembles a rhombus flat building because it has four sides that are relatively of the same length and arranged repeatedly.

d) Pattern Concept

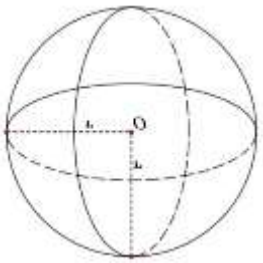
The pattern concept can be seen in the arrangement of rope weaving that forms a regular repetition of rhombus across the entire surface of the net. The repetition shows a consistent regularity of shape and distance resulting in a uniform geometric pattern.

4. Telipos (Birdcage)

Telipos is a traditional tool used by the people of the Tidung Tribe as a breeding ground for serindit birds. In addition to being used to raise birds, Telipos is also used as a trap cage to lure wild serindit birds in the forest. This artifact is made from the main material of rattan or bamboo which is arranged into a strong but still light cage frame.



Pict 10. Artefak Telipos



Pict 11. a) Balls

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A sphere is a curved side space that is bounded by one closed curved side. The surface of the sphere is a set of all points that are equally spaced to a fixed point called a central point. The distance from the central point to each point on the surface of the sphere is called the radius (Ministry of Education, Culture, Research, and Technology, 2021). The concept of a sphere can be seen on the main body of the artifact which is almost round. The shape resembles the shape of a ball room because it has a surface that curves in all directions so that it provides a wider space to accommodate the catch.

b) Tube Concept

The concept of the tube is seen on the neck of the artifact which is elongated with a circular cross-section. This part functions as an entrance as well as a link between the outside and the main chamber of the trap.

c) Circle Concept

The concept of a circle can be seen in the opening of the neck and in the circles of the woven frame. This shape shows the existence of a cross-section that has a relative distance from the central point so that it resembles a flat shape of a circle.

d) Pattern Concept

The concept of pattern can be seen in the arrangement of rattan weaving that is repeated regularly. The weaving forms a repetition of vertical and horizontal lines with relatively equal distances so that it produces a consistent geometric pattern. In addition to providing aesthetic value, the woven pattern also strengthens the structure of the artifact so that it is not easily damaged when used.

5. Baboon



Pict 12. Artefak Babun

Baboons are traditional musical instruments of the Malay and Tidung communities that belong to the group of membranophonic musical instruments, which are musical instruments that

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produce sound from the vibrations of the membrane or membrane that is hit. The membrane is generally made of animal skin that is stretched on one side of the body of the musical instrument. Baboons are used as an accompanying musical instrument in various customary, religious, and traditional art performances of the Malay and Tidung communities. This drum artifact is a musical instrument used in various traditional and artistic activities of the Tidung community. Based on the results of observations, this artifact contains several mathematical concepts, namely beheaded cones, circles, and patterns.

a) The concept of the stump cone

The concept of a beheaded cone can be seen on the drum body. The top has a larger diameter and then shrinks towards the center, while the bottom widens again to form a base. The shape resembles two cone chambers arranged facing each other. This design provides balance to the drum while producing a resonant space that supports sound quality.

b) Circle Concept

The concept of a circle can be seen on the upper surface of the drum used as a punch field as well as on the base. Both parts are circular because they have points on the circumference that are relatively equal to the center point.

c) Pattern Concept

The concept of pattern can be seen in the circular lines that decorate the body of the drum. The lines are arranged repeatedly at relatively equal distances so that they form an orderly geometric pattern and give aesthetic value to the artifact.

7. Tar



Pict 13. Tar Artifacts

Tar is a traditional musical instrument of the Malay and Tidung communities that is used as an accompaniment musical instrument in customary, religious, and traditional art performances. Tar belongs to the group of membranophonic musical instruments, which are musical instruments that produce sound from

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the vibrations of the membrane that is hit. This musical instrument has almost the same function as Babun, but it differs in its physical form. This drum artifact is a traditional musical instrument used in various traditional activities and cultural performances of the Tidung people. Based on the results of observations, this artifact contains mathematical concepts in the form of a stomped cone, circle, triangle, and pattern.

a) The concept of the stump cone

The concept of a stumped cone can be seen in the body of the drum which has a larger diameter at the top and is getting smaller towards the bottom. This shape resembles the shape of a stump cone chamber because it has two circular planes that are parallel to different sizes and are connected by curved sides. This shape provides balance to the drum and supports the formation of a resonant chamber that produces sound.

b) Circle Concept

The concept of a circle appears on the upper surface of the drum as a punch plane, a base, and the binding rings that surround the drum body. These parts are circular because they have points on the circumference that are relatively equal to the central point.

c) Triangle Concept

The concept of a triangle can be seen in the arrangement of ties that cross each other between the binding rings. The crossing of the ropes forms a flat structure resembling a triangle that is arranged repeatedly around the drum body. The shape of the triangle functions to maintain the firmness of the drum skin so as to produce optimal sound.

d) Pattern Concept

The concept of the pattern is seen in the arrangement of the ropes and the binding rings that form regular repetition over the entire surface of the drum body. The repetition of the triangular shape and the lines indicates a geometric regularity that not only strengthens the structure of the drum, but also gives aesthetic value to the artifact.

Mathematical Principles in Artifacts of the Tarakan City History Museum

Based on the results of observations of artifacts in the Tarakan City History Museum, it was found that each artifact not only contains mathematical concepts, but also shows the existence of mathematical principles. According to Gagné, a principle is a relationship between two or more concepts that form a rule or relationship. In this study, the mathematical principles found include the relationship between size, pattern order, and relationship between geometric structures.

1. Size Relationship

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The principle of size relationship can be seen in artifacts that have a difference in size between parts so that they form a certain function. For example, the Bebingon artifact has a smaller diameter than the bottom so that it resembles a beheaded cone. Similarly, in drum artifacts, the diameter of the upper part is larger than the bottom so that it forms a body that resembles a beheaded cone. The difference in size not only gives a distinctive shape, but also supports the function of the artifact according to its use.

2. Pattern Regularity

The principle of pattern regularity is found in almost all artifacts made through weaving techniques and rope arrangements. Bebingon, bubu, traditional nets, fish traps, and woven baskets show woven patterns that are arranged repeatedly with relatively equal distances. In drum artifacts, the pattern is seen in the arrangement of ties that form a regular triangular repetition around the drum body. The regularity of the pattern indicates the application of the concept of repetition and uniformity in the process of making artifacts.

3. Relationship Between Geophysical Structures

The principle of geometric interbuilding relationships can be seen in artifacts that are composed of more than one geometric shape. For example, bubu artifacts are a combination of the concepts of cones, tubes, circles, and patterns. Woven basket artifacts combine the concepts of blocks, rectangles, rhombuses, and patterns. Meanwhile, drum artifacts combine the concepts of spiked cones, circles, triangles, and patterns. The relationship between these buildings shows that a single cultural artifact can contain several interrelated geometric concepts and form a functional unit.

Based on the results of the research, the most dominant mathematical principle in the artifacts of the Tarakan City History Museum is the regularity of patterns. This can be seen from the number of artifacts made using weaving techniques or rope arrangements that form a consistently repeating pattern. In addition to functioning as an aesthetic element, the pattern also strengthens the structure of the artifact so that it is in accordance with the function and needs of the community. This finding shows that the community has indirectly applied mathematical principles in the process of making various cultural artifacts that have been inherited from generation to generation.

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Table 2 Summary of Mathematical Concepts and Principles in Artifacts of the Tarakan City History Museum

No.	Artifacts	Mathematical Concepts	Principles of Mathematics
1.	Bebingon	Circle, Stomped Cone, Rhomhu, Pattern	Pattern Regularity, Size Relationship, Interbuilding Relationship
2.	Bubu Canon	Circles, Tubes, Cones, Patterns	Pattern Regularity, Size Relationship, Interbuilding Relationship
3.	Sontul/Ambau	Curved Lines, Rhombutes, Patterns	Pattern Regularity, Symmetry
4.	Telipos	Circle, Symmetry, Pattern	Pattern Regularity, Symmetry
5.	Baboon	Circle, Spiked Cone, Symmetry	Size Relationship, Symmetry
6.	Tar	Circle, Spiked Cone, Triangle, Pattern	Pattern Regularity, Size Relationship, Interbuilding Relationship

An exploration of six cultural artifacts of the Tidung tribe at the Tarakan City History Museum (Bebingon, Bubu Kanon, Bintul/Ambau, Telipos, Babun, and Tar) shows that there is a real integration of the concepts of flat building, spatial building, and geometric patterns. The shape of circles and patterns is the most dominant element, both in the opening of containers, musical instruments, and repetitive weaving and rope knot techniques. In addition to conceptual aspects, essential mathematical principles were also identified, such as the regularity of patterns that strengthen the structure of artifacts, the proportion of size relationships between parts, symmetry balance, and the relationships between geometric structures that form functional units.

These findings prove that the Tidung people have applied mathematical ideas intuitively and contextually to respond to the needs of daily life, in line with D'Ambrosio's ethnomathematical premise. These results also strengthen previous studies on the potential of cultural artifacts as educational media, with a new focus on the material representation of the Tidung tribe. Practically, the existence of artifacts in this museum has great potential to be transformed into a contextual and meaningful mathematics learning resource, as well as a strategic means of fostering cultural literacy and preserving the heritage of local traditions.

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CONCLUSION

Based on the results of research at the Tarakan City History Museum, seven cultural artifacts of the Tidung tribe were identified including Bebingon, Bubu Kanon, Bintul/Ambau, Telipos, Babun, and Tar which manifest a close relationship between local culture and mathematics. These ethnomathematical elements are reflected through various geometric concepts (circles, tubes, cones, spiked cones, blocks, rectangles, rhombos, triangles), woven regularity patterns, and symmetrical lines. In addition, the design of these artifacts is based on functional mathematical principles such as the relationship between proportions of size, structure, and balance of shapes applied intuitively by the people who make them. Thus, these historical artifacts are not only of cultural and historical value, but also have significant potential as a medium and source of contextual mathematics learning based on local wisdom.

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