

Exploring of Ethnomathematics in the Local Culture of North Karawang Coastal Fishermen for Elementary School Mathematics

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Abstract. This research aims to explore the activities of fishermen on the coast of Sungai Buntu Beach, Karawang, that contain mathematical concepts, and to map them into the learning outcomes of phases A–C at the primary school level. A qualitative approach with an ethnographic design was used, through observation, interviews, and documentation. The data were then analysed with data reduction, presentation, and conclusion drawing, and their validity was tested through triangulation. The results show that fish trading activities contain number concepts; calculating the catch in a basket reflects algebra through variables and simple equations; the salting and weighing of fish emphasise measurement, proportionality, and capacity; the shapes of boats, nets, baskets, drying racks, and fish crates demonstrate the application of geometric concepts in 2D and 3D shapes; and seasonal catch patterns, trading transactions, and the salting of dried fish provide a context for data analysis and probability. These findings affirm that the cultural practices of fishermen in the North Karawang coastal area, particularly those in Sungai Buntu Beach can be used as an authentic source for contextual, relevant, and meaningful mathematics learning, and are also applicable to other coastal regions with similar cultural characteristics such as the North Coast of West Java, supporting the development of local culture-based teaching materials to enhance students' motivation, understanding, and learning outcomes.

Keywords: Elementary Schools; Ethnomathematics; Fishermen Community; Indonesian Culture; Local Wisdom

Abstrak. Penelitian ini bertujuan mengeksplorasi aktivitas nelayan di pesisir pantai Sungai Buntu, Karawang, yang mengandung konsep matematika, serta memetakannya ke dalam capaian pembelajaran fase A–C di sekolah dasar. Pendekatan kualitatif dengan desain etnografi digunakan, melalui observasi, wawancara, dan dokumentasi, kemudian dianalisis dengan reduksi data, penyajian, dan penarikan kesimpulan, serta diuji keabsahannya melalui triangulasi. Hasil penelitian menunjukkan aktivitas jual beli ikan memuat konsep bilangan; perhitungan hasil tangkapan dalam keranjang mencerminkan aljabar melalui variabel dan persamaan sederhana; penggaraman dan penimbangan ikan menekankan pengukuran, proporsionalitas, dan kapasitas; bentuk perahu, jaring, bakul, tempat jemur, dan keranjang ikan menunjukkan penerapan konsep geometri pada bangun datar dan ruang; serta pola tangkapan musiman, transaksi jual beli, dan penggaraman ikan asin menyediakan konteks untuk analisis data dan peluang. Temuan ini menegaskan bahwa praktik budaya nelayan di pantai Sungai Buntu dapat dijadikan sumber autentik untuk pembelajaran matematika yang kontekstual, relevan, dan bermakna bagi untuk wilayah pesisir lain dengan karakteristik budaya serupa, seperti Pantai Utara di Jawa Barat, serta mendukung pengembangan bahan ajar berbasis budaya lokal untuk meningkatkan motivasi, pemahaman, dan hasil belajar siswa.

Kata kunci: Budaya Indonesia; Etnomatematika; Kearifan Lokal; Masyarakat Nelayan; Sekolah Dasar



INTRODUCTION

Education and culture are two aspects that cannot be separated from people's daily lives. Culture functions as a whole that applies in the social order, while education is a fundamental need for every individual to develop knowledge and scientific insight (Sulaiman, 2019). Culture reflects a system that is integrated into society, while education is a basic need for every individual (Lubis et al., 2018). Education is an important aspect of life that plays a major role and is closely related to the learning process, including mathematics learning (Azizah et al., 2024). Thus, the relationship between education and culture emphasises that the integration of the two is an important foundation for realising mathematics learning. In this context, strengthening the cultural dimension in mathematics learning becomes essential to ensure that learning remains meaningful and closely connected to students real-life experiences.

Mathematics is a subject that must be studied by students from primary school to university level (Sutarto et al., 2021). Although mathematics is compulsory for students, many students still find it difficult and uninteresting, so more effective strategies are needed to increase their interest, motivation, and positive attitude towards mathematics learning (A. F. Wulandari et al., 2024). Sutarto et al. (2021) state that teachers need to be reflective about the conditions of their students by utilising relevant and contextual learning resources so that learning is closer to their daily lives. According to Fitriyah & Syafi'i (2022) mathematics can be learned through the culture that develops in society, so that the learning process becomes more down-to-earth and closer to the students' experiences. However, both teachers and students in primary schools are generally only familiar with some cultural mathematics terms, but rarely apply them directly in learning activities (Anriana et al., 2023). Consequently, the potential of culture as a contextual learning source has not been fully utilised in classroom practices.

One approach that represents the integration of local culture and mathematical concepts in learning is called ethnomathematics (D'Ambrosio, 1985). This approach combines elements of community culture with mathematical concepts learned in school (Muhammad, 2023). Ethnomathematics reflects the connection between mathematical concepts and cultural contexts, emphasising that the values and cultural practices of a community contain mathematical elements that can be identified and utilised in the learning process (A. F. Wulandari et al., 2024). Ethnomathematics learning aims to link students' knowledge with their understanding of their surroundings (Nugraha et al., 2020). Thus, ethnomathematics can be understood as a form of cultural anthropology in the context of mathematics.

Ethnomathematics acts as a bridge between community traditions and the world of education, particularly in mathematics learning (Diniyati et al., 2022). Kabuye Batiibwe (2024) concludes that ethnomathematics can be utilised in learning, teaching, and assessment. Sakinah et

al. (2023) state that the application of ethnomathematics can facilitate learning and support optimal learning outcomes. The application of ethnomathematics in classroom learning encourages students to understand the connection between culture and mathematical concepts (Utami et al., 2020). Fajriah et al. (2021) even emphasise that culture-based mathematics learning is one strategy for optimally developing students' reasoning skills. In addition, mathematics linked to cultural contexts can be a memorable and effective teaching method because interesting material tends to evoke positive emotions, increase enthusiasm, and influence students' understanding, memory, and learning outcomes (D. U. Wulandari et al., 2024). Building on this idea, culturally grounded environments offer authentic entry points for strengthening conceptual understanding and student engagement in mathematics.

Ethnomathematics recognises the diversity of ways in which mathematics is applied in accordance with the lives and activities of communities (Jayanti & Puspasari, 2020) including in the daily activities of the communities along the north coast of Karawang, which are rich in culture-based mathematical practices. Along the northern coast of Karawang, there is a community called Pantai Sungai Buntu, located in the Pedes sub-district, Karawang regency. Exploring the concept of ethnomathematics in the activities of the coastal community of Sungai Buntu is the first step in identifying hidden mathematical concepts in local culture. This context has the potential to be developed into a contextual and meaningful source of mathematics learning for students. Yuliana et al. (2022) show that the connection between mathematics and culture can increase the effectiveness of learning. Ethnomathematics-based learning has also been proven to improve students' understanding and learning outcomes, as seen from the increase in students' scores and enthusiasm (Kencanawaty et al., 2020). In line with these findings, a systematic investigation of the Karawang coastal area has the potential to reveal mathematical structures embedded in local fishing practices that have been passed down through generations, including the processing of catches into salted fish as the community's main livelihood. Accordingly, a more in-depth mathematical mapping is needed to strengthen the research foundation in this context.

Various studies have shown that coastal community activities naturally incorporate culture-based mathematical practices. Sulaiman (2019) states that the coastal community at Gebang Fish Market, Cirebon Regency, practises ethnomathematics through activities such as counting, measuring, and designing market buildings that reflect traditional measurements and spatial design. Safruddin et al. (2024) found that the activities of fishermen on Gorom Island contain mathematical concepts such as number operations, algebra, social arithmetic, as well as measurement, proportion, time, volume, and distance in a contextual manner in the process of smoking and marketing julung fish. Silviani et al. (2022) found that the mathematical concepts contained in the culture of sea almsgiving on the coast of Cilacap include six basic activities, namely counting, location

determination, measurement, design, games, and explaining. These findings confirm that coastal activities can be a contextual learning resource for integrating local culture into mathematics learning, so that it is closer to the real lives of students.

Based on previous studies, ethnomathematics studies in the Karawang coastal area are still very limited, even though fishing activities in this area are rich in mathematical practices that can be used as learning resources. Consequently, the Karawang context presents a distinct research gap and offers scientific novelty, as these cultural–mathematical practices have not been systematically mapped to elementary school learning outcomes. Therefore, this study aims to explore the ethnomathematics of the coastal community of Sungai Buntu, Karawang, and to clearly identify the mathematical concepts embedded in their cultural practices based on the learning outcomes of phases A–C in elementary school. These objectives provide a contextual foundation for the development of mathematics learning based on local culture.

METHOD

This study uses a qualitative method with an ethnographic design to explore the cultural practices of coastal communities that contain mathematical concepts. Ethnography was chosen because it allows for a deep understanding of community interactions through participatory observation, in-depth interviews, and documentation of community activities (Sunaryanto, 2021). According to Cohen, Manion, dan Morrison (2017), ethnographic research is a qualitative study that seeks to understand the culture and social practices of a group in its natural context, emphasising the participants' perspectives through direct observation and interaction. The research was conducted in the coastal area of Sungai Buntu Beach, Pedes District, Karawang Regency, involving six indigenous fishing community members selected purposively based on their roles in traditional fishing-related activities. This location was chosen because the Sungai Buntu community practices fishing and the processing of fish into salted fish as a livelihood, both of which have been passed down through generations. Data collection included unstructured interviews guided by interview prompts, participatory observation of general fishing practices such as trading, handling and measuring fish catches, and fish-processing routines, as well as documentation of tools, materials, and community activities.

Data was collected from literature to understand the theoretical framework and cultural context, as well as field data in the form of field notes, subjects' statements and actions, and supporting documentation. The main research instrument was the researcher himself, assisted by observation guidelines, interview guidelines, and documentation sheets to maintain data consistency and relevance (Sugiyono, 2022). Participants consisted of one fisherman engaged in fish-catching for salted-fish production, two salted-fish processors, one fishing-net crafter, one

salted-fish entrepreneur, and one fish seller in the traditional market. The inclusion criteria were individuals directly involved in coastal cultural practices, indigenous members of the Sungai Buntu fishing community, and willingness to participate in interviews and observation.

Key interview questions focused on daily activities, traditional procedures, measurement or estimation practices, tools and materials used, and local cultural terms related to quantities or proportions. Documentation involved photographs and field notes of tools, equipment, processed materials, workspaces, and sequences of activities taken using a mobile camera and field-note sheets. The data obtained were presented descriptively and qualitatively, analysed through the stages of data reduction, data presentation, and conclusion drawing, thus enabling the interpretation of the relationship between cultural practices and mathematical concepts in primary schools, with validity maintained through triangulation and information cross-checking (Sugiyono, 2022; Sunaryanto, 2021). Triangulation was conducted by cross-checking information from observations, interviews, and documentation to ensure consistency and accuracy of the data.

RESULTS AND DISCUSSION

Based on observations and interviews with the coastal community of Sungai Buntu Beach, North Karawang, the researcher found that various fishing activities contain mathematical concepts relevant to elementary school learning. The participants were coded as follows: F1 (*fish catcher for salted fish*), F2 and F3 (*salted fish processors*), F4 (*fishing-net crafter*), F5 (*salted fish entrepreneur*), and F6 (*fish seller in the traditional market*).

The activities were categorised based on daily fishing practices, including buying and selling fish, measuring fish in small and large baskets, salting fish, and observing seasonal catch patterns. Each activity could be mapped to mathematical concepts such as numbers, algebra, measurement, geometry, and data analysis & probability.

Fish Buying and Selling Activities

Based on observations of fish trading activities at the traditional fish market in Sungai Buntu (participant F6, *fish seller*), this activity represents an authentic real-world context where various numerical ideas naturally emerge. Fishermen weigh fish per kilo and determine the price, so the concepts of addition, subtraction, multiplication, division, fractions, and decimals arise naturally in daily practice. Sutarto et al. (2021) show that fishermen apply addition, subtraction, multiplication, and division in calculating selling prices and profits and losses. One example observed in Sungai Buntu is when a buyer purchases multiple types of fish. For instance, if a buyer purchases 2 kg of *tembang* (*local sardine*) and 3 kg of *tongkol* (*mackerel tuna*) at different prices per kilogram, the total payment is calculated as: $(2 \times \text{price of tembang}) + (3 \times \text{price of tongkol})$. This provides a

concrete problem that can be used for elementary students to practice arithmetic in a meaningful context. Daily communication also involves the use of numerical expressions in the local language, such as “*tuku telu kilo*” (buy three kilos) or “*regane loro ewu*” (the price is two thousand), showing that numbers function not only as abstract symbols but also as cultural communication tools (Sulaiman, 2019).

In fish trading activities, fish prices at the Sungai Buntu Fish Auction Site (TPI) fluctuate daily. For example, the price of mackerel tends to be higher on holidays than on normal days. Students can record prices every day, compile data in tables, bar charts, or line charts, then calculate measures of central tendency (mean, median, mode) and measures of dispersion (range). They can also determine simple probabilities, such as the likelihood of fish prices rising on weekends compared to weekdays.

Safuruddin et al. (2024) identified the application of numerical operations in the economic transactions of the coastal community of Pulau Gorom Subdistrict, such as calculating selling prices, profits, losses, and the use of numerical operations in smoking julung fish. However, in the context of Sungai Buntu, there is an emphasis on the use of local language in fish buying and selling transactions, so that numbers are not only a counting tool but also part of local cultural communication. This approach enriches students' learning experiences by connecting mathematical material with specific local cultures, while reinforcing previous research findings that traditional economic activities can be an authentic medium for learning numbers. Recent literature indicates that in many ethnomathematics studies, number systems emerge as cultural contexts that are often used to embed school number concepts, including in calculation symbol activities, cultural games, and weaving (Kabuye Batiibwe, 2024). Fish buying and selling activities provide authentic, culturally grounded contexts for learning number operations in Phases A–C.

Measuring Fish Catches Using Small and Large Baskets

Algebraic elements appear explicitly in the activities of the Sungai Buntu coastal community, particularly in calculating fish catches. Based on interviews with fishermen (Participant F1, *fish catcher for salted fish*), they use *rinjing* (small bamboo baskets) with a capacity of 15 kg and large baskets of 80 kg. The total fish can be modelled algebraically with the symbol x for *rinjing* and y for the large basket. For example, if a fisherman has 2 *rinjing* and 3 large baskets, the total fish can be modelled as $x = 15$ kg and $y = 30$ kg, so that the final result is $(2 \times 15) + (3 \times 80) = 30 + 240 = 270$ kg. Figures 1 show *rinjing* and the large basket used by fishermen in Sungai Buntu, which provide a concrete visual context for understanding algebraic modelling with variables x and y .



Figure 1. *Rinjing* (Small Bamboo Basket) and the Large Basket

Figure 1 illustrates both the small bamboo basket ($x = 15$ kg) and the large basket ($y = 30$ kg) used by fishermen. This phenomenon is in line with the findings of Rif'at et al. (2021), which show that algebraic and visual representations help students understand mathematical problems, and concrete experiences bridge symbolic understanding. In other words, the daily practices of coastal communities produce algebraic models that provide concrete examples of how mathematical symbols generalise concrete experiences. Safruddin et al. (2024) found that the coastal community of Gorom Island applies algebraic operations in their daily activities, such as arranging fish smoking and calculating the number and price of fish. This finding supports the notion that the application of algebra in the context of coastal communities is a common phenomenon, while also emphasising the relevance of the local context as an authentic source for mathematics learning in primary schools. In the context of the activities of Sungai Buntu fishermen, the explicit use of algebraic symbols (x and y) provides opportunities for students to connect real-world practices with formal mathematical models.

Calculating fish catches using small and large baskets provides a contextual foundation for learning algebra. In Phase A, students learn to recognize basic symbols such as the equals sign ($=$). In Phase B, they begin to formulate and solve simple equations to calculate total weight. In Phase C, this activity develops proportional reasoning and the modelling of ratios based on the different basket capacities.

Fish Salting Activities

Fish salting activities in Sungai Buntu present concepts of proportionality and measurement that can be analysed mathematically. The community routinely uses measurements and ratios in daily practices, such as weighing fish and determining the amount of salt for salting. This is in line with research on the community at Gebang Fish Market, Cirebon, which shows that the community carries out culture-based mathematical activities, including measurement (Sulaiman, 2019). Measurement activities were also found in the culture of sea almsgiving on the coast of Cilacap,

which states that the community uses measurement as part of their daily activities, such as determining the amount of alms, the size of materials, or the distance of ritual activities (Silviani et al., 2022).

The activity of measuring fish and salt in the production of salted fish in Sungai Buntu provides a real-world context for learning data analysis and probability. For example, salted fish producers use a salt ratio of 10–30% of the weight of the fish in the salting process. For 5 kg of fish with a ratio of 20%, the amount of salt used is 1 kg. This variation in ratio produces quantitative data that can be recorded and analysed, allowing students to compare differences in measurements, understand proportions, and model the linear relationship between fish weight and salt quantity, which can be presented in tables, bar charts, and line graphs. Figure 2 illustrates how salted fish processors in Sungai Buntu measure the amount of salt according to the weight of the fish.



Figure 2. Measurement of Salt

Figure 2 shows the salt measurement used in the fish salting process. Participants F2 and F3 (*salted fish processors*), they use a salt ratio of 10–30% of the fish weight in the salting process. Delima et al. (2022) emphasise the importance of ingredient ratios in salted fish processing, while Olivero-Acuña et al. (2025) show the application of conventional and non-conventional ratios and units of measurement in the production of coastal cheese in Manatí, Colombia. Interviews with salted fish artisans indicate that for 5 kg of fish with a salt ratio of 20%, the amount of salt used can be calculated as follows: amount of salt = 5 kg x 20% = 1 kg. Variations in salt ratios from 10% to 30% allow students to compare differences in measurements with the same fish weight, thereby understanding the concepts of comparison and proportional variation. If the fish weight increases, students can estimate the amount of salt needed linearly, demonstrating a simple linear function relationship between fish weight and salt quantity.

Fish salting in Sungai Buntu provides a real-life context for learning measurement and proportionality. Students can estimate quantities using non-standard units (Phase A), measure with

standard units and determine ratios (Phase B), and calculate container capacity and measure salt proportionally (Phase C).

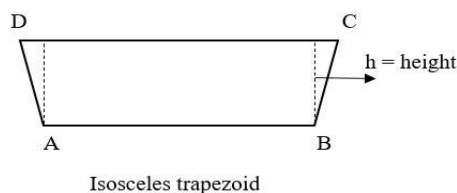
Fishing and Fish Processing Tools

The boats used by Sungai Buntu fishermen are not only part of their daily lives, but also contain mathematical concepts that can be explored in primary school learning through an ethnomathematics approach. Simanjuntak et al. (2025), show that the roof of a Bolon house is trapezoidal in shape for structural purposes, so that geometric concepts arise authentically in everyday life. The trapezoidal shape found on the boat can be seen in Figure 3.



Figure 3. Geometric Shape of a Boat

Figure 3 shows the side of a fisherman's boat in the shape of an isosceles trapezoid, wider at the top and narrower at the bottom, providing stability when floating. This trapezoid can be further analysed formally, as shown in Figure 2, namely trapezoid ABCD with parallel sides AB and CD and angles that can be calculated to understand the area and properties of the trapezoid.



Isosceles trapezoid

Figure 4. Mathematical Model of Trapezoid ABCD on the Hull of a Boat

Based on Figure 4, the isosceles trapezoidal shape on the side of a fishing boat can be analysed using plane geometry concepts. The trapezoid has a pair of parallel sides, namely AB (the bottom of the boat) and CD (the top of the boat), as well as sloping sides AD and BC that are equal in length. One of the properties of an isosceles trapezoid is that the angles at each base are equal, so that $\angle A = \angle B$ and $\angle C = \angle D$.

In the context of a boat, AB represents the wider upper section for stability, CD represents the narrower lower section, and h is the perpendicular distance between the two parallel sides. By knowing the dimensions of AB, CD, and h, students can calculate the area of the boat's side, which

is relevant for understanding the volume of material used or the surface area in contact with water. Thus, an isosceles trapezoidal boat becomes a real-world context for learning about the properties of trapezoids, area calculations, and the application of Pythagoras' theorem, while connecting formal mathematics with the cultural practices of local fishermen.

Apart from boats, Sungai Buntu coastal fishermen use fishing gear made primarily from nylon. Based on interviews with participant F4 (*fishing-net crafter*), the trawl nets are crafted with diamond-shaped patterns that maintain uniform size and angles to ensure efficiency in catching fish. Trawl nets, as a traditional fishing tool, apply geometric concepts in certain parts. The geometric shapes found in diamond-shaped fishing nets are (Malalina et al., 2020). The geometric shapes in trawl nets can be seen in Figure 5.



Figure 5. Geometric Shapes of Trawl Nets

Figure 5 shows the diamond shape on the trawl nets of fishermen in Sungai Buntu (participant F6, *fish seller*), where the woven ropes form a regular quadrilateral pattern. This rhombus shape can be analysed mathematically because it has special properties such as equal sides, equal opposite angles, and diagonals that bisect each other. In a mathematical model, rhombus ABCD has four equal sides and equal opposite angles. Diagonals AC and BD are perpendicular to each other and bisect each other into two equal parts. With an opposite C, diagonal AC extends from point A to point C, while diagonal BD extends from B to D. This property allows students to recognise the symmetry in a rhombus and the relationship between its sides and angles.

The diagonals AC and BD can be measured from the woven pattern of the fishing net, allowing students to learn to relate the length of the sides, diagonals, and area to real objects. Students can also see that the diagonals divide the rhombus into four isosceles triangles, which is simple for introducing triangles and the relationship between sides and angles in primary school. Thus, fishermen's nets provide a real-world context for learning the basic properties of rhombuses, symmetry, diagonals, and area concretely. This integration shows that fishermen's cultural practices contain mathematical concepts that are relevant to the learning outcomes of geometry (Malalina et al., 2020).

Other geometric elements are found in the baskets used to store fish by sellers at the Sungaibuntu fish market. The surface of the basket is circular, so it can be used as a context for learning geometry. Students recognise the flat shape of a circle, learn about radius, diameter, and area, and analyse the application of these concepts in everyday life. The shape of the basket can be seen in Figure 6.



Figure 6. Geometric Shape of Fish Basket

Figure 6 shows the circle on the fish basket at the Sungai Buntu market, which can be analysed mathematically. A circle has distinctive characteristics, namely a centre point and curved lines that form sides without angles. From this shape, students can recognise the radius as a line from the centre to the edge, and the diameter as a straight line that passes through the centre and connects two points on the circle. The concept of circumference can be introduced by measuring the length of the basket's rim, while the area of the circle can be used to estimate its capacity. Through simple activities such as measuring the diameter and then comparing it to the circumference, students can understand the relationship between the radius, diameter, and circle in the context of real everyday life. Thus, fish baskets are not only practical but also serve as a means of contextual, authentic, and meaningful mathematics learning, in line with the findings of Diniyati et al. (2022) that cultural objects can be used to introduce geometric concepts, including circles.

The rectangular shape of the salted fish drying rack in Sungai Buntu can be analysed mathematically because it has distinctive features such as parallel sides and right angles. The rectangular shape of this salted fish drying rack can be seen in Figure 7.

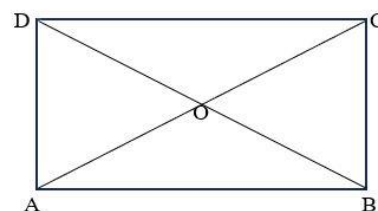


Figure 7. Geometric Shape of Fish Drying Rack

Figure 7 shows the rectangular shape of the salted fish drying area in Sungai Buntu, which can be analysed mathematically through its basic properties. Rectangle ABCD has opposite sides that are parallel and equal in length, namely AB is parallel to CD and AD is parallel to BC, and all four angles are right angles. Diagonals AC and BD are equal in length and intersect at the centre at point O, dividing the rectangle into two congruent right-angled triangles. The area of the rectangle is calculated by multiplying the length and width ($L = AB \times BC$), while the perimeter is obtained from the sum of all sides ($K = 2 (AB+BC)$). For example, if the length $AB = 2.5$ m and the width $BC = 1.2$ m, then the area of the drying place is 3 m^2 . This concept can be directly related to community activities, for example, to estimate the capacity of fish that can be dried based on area, or to calculate the material requirements for the frame based on its perimeter, so that mathematics is not only studied abstractly but also has meaning through local cultural practices.

In addition to flat shapes, geometric shapes in fish storage containers are also found in the shape of fish baskets. Baskets made of woven bamboo are cylindrical in shape and are used to store fish caught by fishermen, while plastic baskets are rectangular in shape and are used to store fish that will be weighed during the fish trading process. The geometric shapes of fish baskets can be seen in Figure 8.



Figure 8. Geometric Shape of Bamboo Basket

Figure 8 shows the cylindrical part of the fish basket used by Sungai Buntu fishermen. The cylinder has two parallel circular bases, curved sides connecting the two bases, and a height equal to the distance between the bases. By observing the shape of this basket, students can recognise the elements of a tube, such as radius, diameter, and height, and then relate them to the concept of volume to estimate the number of fish that can be held. For example, students can understand that the larger the diameter of the base or the taller the tube, the greater the capacity of the basket. This activity helps students relate formal mathematical concepts to real-life experiences, making their understanding of cylindrical shapes more concrete and contextual.

Meanwhile, rectangular plastic baskets are used to weigh larger fish. The rectangular shape allows students to recognise elements of shapes such as sides, edges, and angles, and to understand

the relationship between length, width, and height with surface area and volume. (Sakinah et al., 2023), show that the Bugis people use cylindrical Tumbu' and rectangular supports to hold fish, where capacity measurements and volume calculations are applied informally. The rectangular shape of these plastic baskets can be seen in Figure 9.

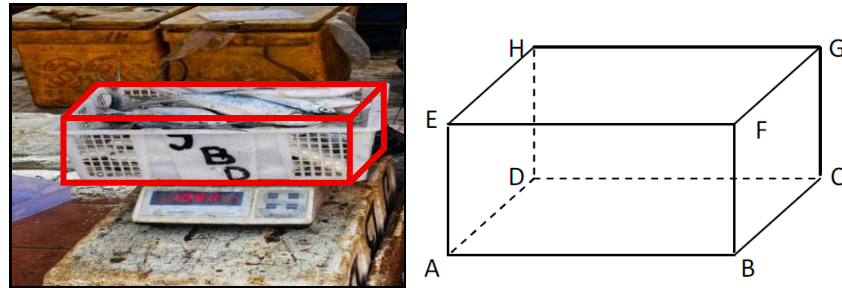


Figure 9. Geometric Shape of Plastic Baskets

Figure 9 shows a rectangular plastic basket used for weighing fish, which can be used as a real-life context for teaching solid geometry in primary school. The rectangular prism ABCDEFGH has a base ABCD and a top EFGH, with front side ABEF, back side CDGH, right side BCFG, and left side ADEH. The prism has six rectangular sides, twelve edges, and eight vertices. The length (AB), width (AD), and height (AE) are the basis for calculating the surface area and volume of the block, with the volume formula $V = p \times l \times t$. As a simple example, if a plastic basket has a length of 40 cm, a width of 30 cm, and a height of 25 cm, its volume can be calculated as follows: $V = 40 \times 30 \times 25 = 30,000$ litres. This means that the basket can hold around 30 kg of fish (if 1 litre is approximately equal to 1 kg of fish). Through this example, primary school students can more easily understand the relationship between the length, width, and height of a block and its storage capacity. In addition, students can also compare blocks with cylinders or other shapes to see which is more efficient to use.

Seasonal Patterns of Catch and Market Distribution

Various fishing activities in Sungai Buntu, including recording and observing seasonal patterns of catches, provide a rich real-world context for learning data analysis and probability. Based on interviews with participant F5, a salted fish entrepreneur, these activities generate quantitative data that can be recorded, analysed, and presented in tables or diagrams, enabling students to understand measures of central tendency, measures of dispersion, data variation, and the probability of certain events occurring in everyday life.

Building on this context, one specific activity that can be applied in primary school mathematics learning is examining the seasonal pattern of fish catches. Interviews with F5 show that the number of fish caught each month varies, reflecting clear seasonal trends. For example, fishermen record monthly catches and observe periods of increase and decrease throughout the

year. This real-world data allows students to learn basic statistical concepts, including measures of variation, seasonal averages, and the probability of high or low catches during specific periods, thereby linking numerical analysis to authentic community practices.

Through this activity, primary school students learn to connect numerical data with real events, while practising their skills in reading, presenting, and interpreting data. This type of analysis not only introduces basic statistical concepts but also fosters critical thinking skills in real data. This is in line with the findings of Fajriah et al. (2021), which show that exploring community activities in wetland environments can develop students' higher-order thinking skills, including statistical skills, data analysis, and conclusion.

Overall, the analysis of the daily activities of Sungai Buntu coastal fishermen demonstrates that their practices provide authentic and meaningful contexts for mathematics learning in primary schools. From numerical operations in fish handling, algebraic reasoning in calculating catches, measurement and proportionality in fish salting, to geometric concepts in boats, nets, and fish containers, each activity connects real-life experiences to mathematical concepts. Through these activities, students can develop critical thinking, problem-solving, and data interpretation skills while understanding the relevance of mathematics in local culture. See Table 1, Exploration of Ethnomathematics Activities of the Sungai Buntu Coastal Community into Mathematical Elements Based on Primary School Learning Achievement Phases.

Table1. Exploration of Ethnomathematics Activities of the Sungaibuntuk Coastal Community into Mathematical Elements Based on Primary School Learning Achievement Phases

Element	Ethnomathematics Activities	Phase A	Phase B	Phase C
Numbers	Fish buying and selling transactions (addition, subtraction, simple fractions, decimals)	Understanding numbers & simple operations	Multiplication and division of whole numbers; simple fractions	Calculating total purchases/sales, change
Algebra	Calculating catch results in small/large baskets	Recognising basic symbols (=)	Formulating and solving simple equations	Proportional reasoning; modelling & ratios
Measurement	Fish salting process (salt: fish ratio), weighing, measuring	Estimating non-standard sizes and measurements	Measuring with standard units, determining ratios	Calculating container capacity, measuring salt proportionally
Geometry	Fishing and Fish Processing Tools	Recognising basic two-dimensional and three-dimensional shapes	Assembling and disassembling flat/spatial shapes	Analysing the properties of shapes, calculating simple areas and volumes
Data Analysis & Probability	Fish buying and selling transactions, Fish salting process, and seasonal patterns of catch, market distribution	Sorting and presenting simple data	Organising data into simple tables/diagrams	Presenting complex data, processing frequency data, and discussing probability

Table 1 shows that the cultural activities of the Sungai Buntu coastal community clearly reflect various mathematical elements that correspond to the learning outcomes of phases A–C in primary school.

CONCLUSION

Based on the results of the exploration, the activities of the coastal community of Sungaibuntu Beach contain various mathematical concepts that are relevant to primary school learning. The activity of buying and selling fish displays the concept of numbers through addition, subtraction, multiplication, division, fractions, and decimals. Calculating the fish catch in small and large baskets brings up the concept of algebra, including modelling with the symbols x and y . The process of salting fish emphasises the concept of measurement through measures and ratios, while the shapes of boats, trawl nets, baskets, and fish baskets reflect geometric concepts in flat and spatial figures. The activity of recording fish buying and selling transactions, fish salting process, and seasonal patterns of catch and market distribution provides a context for data analysis and probability.

The mathematical concepts found in the activities of the coastal community of Sungaibuntu Beach can be used to introduce mathematics through local culture, making learning in primary school more meaningful. Each mathematical element can be directly linked to the daily lives of students and supports the development of learning media, interactive modules, student worksheets, or contextual teaching aids.

Further research could explore the activities of coastal communities on the north coast of Karawang, in addition to Sungai Buntu, to expand learning resources and test their direct application in learning activities. In addition, the development of media or learning methods based on coastal activities in Sungai Buntu could strengthen the link between formal mathematics and real-world practice, as well as support increased interest, motivation, and learning outcomes among students.

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