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Ethnomathematical Study on Indigenous Fish Trap: Example from Kijang, Bintan Regency

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Abstract

The continuous exploration of mathematics as a human activity triggers the need to research ethnomathematics. This study aimed to identify ethnomathematics in the manufacture of indigenous fish traps (*Bubu*) from Bintan Regency. This ethnography study uses direct observation, interviews, and documentation. The researcher acts as the main instrument. The data were analyzed using the Spradley analysis technique, namely domain, taxonomic, componential, and cultural theme analysis. Data reduction, data presentation, and conclusions were carried out for each analysis. The results show that there are mathematical activities in designing, counting, and measuring length dimensions in *Bubu*'s making. In these activities, there are mathematical concepts, including three-dimensional figures, the net of three-dimensional figures, curves, odd numbers, sequences with their attributes, bilateral symmetry, symmetry axes, figurative numbers, the congruence of plane figures, and length measurements with non-standardized units. These results showed that the *Bubu* maker already had a geometric sense through the symmetrical concept that became the basis for two activities such as counting and measuring, similar to the results of ethnomathematical research on the Yupiaq Eskimo community in Alaska and the Carolina Islanders in Micronesia. This study provides ideas to utilize everyday phenomena in teaching mathematics as a starting point prior to learning mathematics more formally.

Keywords: Ethnomathematics, Indigenous Fish Trap, Bubu, Mathematical Activities, Mathematical Concepts

Abstrak

Eksplorasi matematika sebagai aktivitas manusia memicu kebutuhan untuk meneliti etnomatematika. Tujuan penelitian ini adalah untuk mengidentifikasi etnomatematika dalam pembuatan alat tangkap ikan tradisional masyarakat Kabupaten Bintan yang dinamakan *Bubu*. Metode penelitian ini adalah etnografi dengan observasi langsung, interview, dan dokumentasi. Peneliti bertindak sebagai instrumen utama. Data dianalisis dengan teknik analisis Spradley yang membagi wilayah analisis menjadi empat meliputi analisis domain, analisis taksonomi, analisis komponensial, dan analisis tema budaya. Untuk tiap analisisnya dilakukan reduksi data, penyajian data, dan kesimpulan. Hasil penelitian ini menunjukkan adanya sejumlah aktivitas matematis dalam merancang, menghitung, dan mengukur dimensi panjang dalam pembuatan Bubu. Dalam aktivitas-aktifitas tersebut terdapat konsep matematika diantaranya bangun ruang, jaring-jaring bangun ruang, kurva, bilangan ganjil, barisan dan atributnya, simetri bilateral, sumbu simetri, bilangan figuratif, kekongruenan bangun datar, serta pengukuran panjang dengan menggunakan satuan ukur tidak baku. Hasil penelitian menunjukkan bahwa pembuat *Bubu* telah memiliki pengetahuan geometris melalui konsep simetris yang menjadi dasar dari dua aktivitas seperti menghitung dan mengukur serupa dengan hasil penelitian etnomatematika pada masyarakat Eskimo Yupiaq di Alaska dan penduduk pulau keturunan Carolina di Micronesia. Hasil penelitian ini dapat berelasi dalam Pendidikan Matematika karena berkontribusi untuk menciptakan pola pembelajaran matematika dengan memanfaatkan fenomena sehari-hari untuk penguasaan matematika secara lebih formal.

Kata kunci: Etnomatematika, Alat Tangkap Ikan Tradisional, *Bubu*, Aktifitas Matematis, Konsep Matematika

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INTRODUCTION

Culture is an essential part of human life that has a connection with past lives until now, and its theory will continue to develop along with changing times (Aprianti et al., 2022; Fuady, 2022; and Iman, 2018) and is not just a product of human work but an idea or ideas contained in the human mind. Cultural elements that can be found in all nations universally consist of elements of language, knowledge systems, systems of social organization, systems of living equipment and technology, livelihood systems, religious systems, and arts (Setiaji, 2022; Bestari et al., 2023).

Culture and mathematics are closely related (Martyanti & Suhartini, 2018), and their development has an impact on the development of mathematical knowledge (Wulandari & Puspadewi, 2016). For example, the emergence of a measurement system in communities living along large rivers where most of the people cultivate crops. The emergence of this measurement system was motivated by the need to measure parcels of agricultural land owned (Martyanti & Suhartini, 2018). The integration of mathematics and culture in education is meant to cultivate the ability to develop cultural heritage according to the current context using the basis of mathematical creative thinking skills that are characterized as logical, rational, and imaginative, accompanied by a sense of aesthetics (Wulandari & Puspadewi, 2016).

According to James and James, *mathematics* in the formal context of science is defined as a science that explains shapes and dimensions, structures, concepts, and logic that are closely related to one another (Rahmah, 2018). Mathematics is based on results that are formed by themselves. In addition, human thought, which is closely related to the activities of thinking, issuing ideas, processing, reasoning, and logic, can form mathematics itself (Siagian, 2016). Based on this relationship, mathematics, behavior, and culture are related. In short, mathematics and culture have a close relationship. This relationship is explained as mathematics that grows, develops, is influenced, and is integrated into aspects of human cultural life, including history, environment, society, and geography (Rosa et al., 2016).

One of the concepts that examines the relationship between mathematics and culture is ethnomathematics. Some definitions lead to one point, which explains that ethnomathematics is a pattern or way of combining many ideas and techniques that are carried out, trained, and developed by a specific group of people (Rosa et al., 2016) and is defined as the special ways used by a certain cultural group or society in mathematical activity. The mathematical activity in question is an activity in which there is a process of abstracting from real experience in everyday life into mathematics or vice versa, including activities of grouping, counting, measuring, designing buildings or tools, making patterns, counting, determining locations, playing, and explaining (Martyanti & Suhartini, 2018).

Ethnomathematics brings the relationship between mathematics and culture to the surface and has made significant progress as a specific study. First, ethnomathematics aims to change the perspective that views mathematics as a formal scientific discipline that has nothing to do with human life in the real world of students (Rosa & Orey, 2011). This perspective is further strengthened by the fact that mathematics is rarely taught in schools properly and contextually, so it is felt to be very difficult for students and not meaningful at all (Febrian, 2016). With the presence of ethnomathematics, the opportunity to re-educate the community in a better way is possible. By emphasizing the link between mathematics and culture through exploration, the possibility of people realizing that they have an intellect closely related to mathematics in everyday life becomes very potent. Second, several ethnomathematical researchers believe that it plays a vital role in mathematics education. Learning by using ethnomathematics would add insight into the existence of mathematics in the cultural elements that are owned and increase curiosity so that they are motivated to learn (Fajriyah, 2018; Rahayu et al., 2018). Third, ethnomathematics can provide meaningful mathematics learning because it is taught contextually through culture. Ethnomathematics can be a didactic phenomenon in the learning process that helps students understand mathematics better.

On that basis, ethnomathematics is still being carried out and developed by several researchers, especially in Indonesia, with its plural cultural characteristics. Several studies have explored ethnomathematics in several cultural community groups in several regions of Indonesia. A number of these studies include research on the Balinese calendar system (Suarjana et al., 2014), on the Sundanese people (Abdullah, 2017), which contains mathematical concepts, and on batik creation (Risdiyanti & Prahmana, 2018), which revealed several geometric patterns developed by artisans. Furthermore, one of the advanced ethnomathematics in research that has been done previously is the existence of ethnomodeling that has developed in the people of Yogyakarta related to the Pranatamangsa system and birth and death ceremonies (Prahmana et al., 2021).

In addition, some studies conducted on people living on the banks of the Musi River relate to the traditional fishing process (Malalina et al., 2020). Another study discusses how the local community of Kokas, Fakfak Regency, uses Sero as fish traps (Ubayanti et al., 2016). However, the results of these studies describe aspects of mathematics that are still limited, especially in tracing aspects of mathematical activity that need to be carried out in more depth to get a more holistic picture. However, these studies have provided avenues for the exploration of similar subjects with different cultural backgrounds and community characteristics. Thus, along with the facts given the limited number of ethnomathematical studies in the Riau Islands, such as ethnomathematical research in the making of Wau Kites in Lingga Regency (Febrian, 2016) and Tanjak Melayu in Tanjungpinang City (Febrian et al., 2022), and considering its geographical characteristics in the form of islands and the diversity of cultural patterns, further research still needs to be done. One of the characteristics of the archipelago is that it has excellent maritime potential. The dominant community has a livelihood as fishermen, so this community group can become a source group for further ethnomathematical exploration. In carrying out their activities, coastal fishermen generally use a fish trap that still tends to be traditional with unique and tactical manufacturing techniques. There is a fish trap called *Bubu* in the Kijang area, Bintan Regency, Riau Islands. *Bubu* is one of the potential ethnomathematical subjects because almost all people in the Riau Islands, especially Kijang, know this traditional fish trap. Therefore, this research identifies ethnomathematics in *Bubu's* manufacture and discusses how mathematical activities and concepts are rooted in the process.

METHODS

This study applies the ethnographic method to discover how mathematical activities and mathematical concepts are used in the manufacture of *Bubu* indigenous fish traps in the Kijang area, Bintan Regency, Riau Islands. Ethnography is suitable to be used as a research method because it follows its purpose to identify and explain ethnomathematics in the practice of community life, which includes exploring several ideas, methods, and techniques (Ascher & D'Ambrosio, 1994; Rosa et al., 2016). The ethnography has some steps, including identification of a culture, defining the research question, literature review, gaining entrance, acquiring informants, participant observation data collection, analysis and interpretation of the data, and an ethnographic report.

According to the type of this research, the main research instrument is the researcher himself (a human instrument). In this case, the researcher acts as a data collector, and his role cannot be replaced, so the researcher's role is a crucial element. The researcher, as the main instrument, is also supported by other instruments, namely observation sheets, interviewing guidelines, and video recordings. Those supporting instruments are rooted in direct observation, interview, and documentation techniques, respectively. This research was conducted for several months to obtain information regarding the ethnomathematics of manufacturing *Bubu*, precisely from January to July 2021. The research subjects were taken using the snowball sampling technique, where the initial sample size was small, then it grew along with the growing interest in the depth of data that could not be obtained only with the previous number of samples. If the data needs to be improved, the researcher will look for other informants to complete the data. In this study, five *Bubu* makers became informants or data sources after the technique was carried out to obtain valid data. The carefully chosen informants were five fishermen in the Kijang area, Bintan Regency, who work daily to catch fish using the *Bubu* fish trap.

The collected data were analyzed using data analysis techniques for ethnographic research based on Spradley, which divides the analysis area into four, namely: domain analysis, taxonomic analysis, componential analysis, and cultural theme analysis (Spradley, 2016). Each analysis carried out several processes, including data reduction, presentation, and conclusion. Data from several collection techniques were compared for consistency with the triangulation technique. Finally, this series of scientific methods was carried out to answer the formulation of the problem of ethnomathematics in the manufacture of fish traps, including mathematical practice and mathematical concepts. The following Table 1 is a recapitulation table that provides an overview of how this research was carried out.

Table 1. Overview of an ethnographic study of creating *Bubu*, the fish trap

Guiding Questions	Initial Responses	Analysis Stage	Point of View	Activity
Where to start looking at it?	In the activities of creating *Bubu* by the fisherman in Kijang, Bintan Regency, where there are potential mathematical practices in it	Domain	Culture	Carrying out the observation and interview with the *Bubu* creator, who is a local of Kijang, Bintan Regency
How to look at it?	Looking into the aspect of creating *Bubu* by the fisherman Kijang, Bintan Regency, where there are potential mathematical practices in it	Taxonomy	Alternative thinking	Determining what potential ideas, ways, or techniques are used by fishermen in creating *Bubu* related to mathematical practice or activities
What is it?	Evidence (mathematical activities or concepts as the outcome of alternative thinking)	Componential	Mathematics and Mathematical philosophy	Recognizing and distinguishing potential specific characteristics in the activity of creating *Bubu* related to mathematics
What does it imply?	The value of culture under study	Cultural Theme	Anthropologist	Describing the ethnomathematics of creating *Bubu* by focusing on the relationship between activities and mathematical ideas or concepts.

RESULTS AND DISCUSSION

Mathematical concepts are widely used in making *Bubu*. In a simple context, it can be seen from the current development of *Bubu*, which varies in terms of shapes such as cage, cylindrical, triangular, rectangular, and semi-circular shapes (Banurea & Tobing, 2019). Based on interviews with fish trap makers, it was determined that *Bubu* is one of the indigenous fish traps made from iron wire that has been passed down from generation to generation. *Bubu* resembles a container with one door as a trap. The trap door is unique because it follows the model of the *Bubu* structure. It was made of iron wire, which was formed into a parabola on the inside. Usually, the traps are placed on the seabed during the east monsoon. Inside, the bait is placed so the fish that see the bait are attracted to enter the trap. If the fish has entered the trap, it cannot get out again because it is trapped. The *Bubu* can be taken after a week of the *Bubu* being placed on the seabed.

Furthermore, the research explored the shape and design of the *Bubu*. Researchers conducted direct observations and interviews with the makers of *Bubu* regarding the manufacturing process to find the potential for ideas, thoughts, strategies, or techniques to emerge. This process is followed by identifying the potential for mathematical activities and concepts rooted in making *Bubu*.

Bubu Construct Design

Bubu, which is constructed using iron wire, is a fish trap that resembles a combination of several shapes, such as a trapezoidal prism and an isosceles triangular prism. In general, the maker of *Bubu* names the parts of the *Bubu*. Among them is the head or the pointed part that resembles an isosceles triangle (on one side of the wire netting) or an isosceles triangular prism when viewed as a whole. The other part is called the body, which is the middle part of *Bubu* created in the form of a cuboid. The last part is two legs in the form of a right triangular prism.

The *Bubu* construct is built by first making the side parts of the space form like a spatial grid consisting of 4 pairs of congruent sides, including two hexagon sides, which are a combination of two congruent parallelograms, two rectangular sides for the side parts, and the other four sides of the rectangle, two each at the head and the other two at the feet. The fish entrance in the middle from the bottom resembles a parabola as the fish's path to the trap. The technique for making these sides by measuring them is described in the next section. Take a look at the following *Bubu* pictures.

Figure 1. *Bubu*

Figure 2. *Bubu*

To make the *Bubu* construct, simple basic materials are used, consisting of wire netting in the form of a hole net and thick wire, which serves to glue several side areas of the trap from the wire net and strengthen the *Bubu*. Generally, the connecting wire functions like an edge in the shape of a space. Overall, the dimensions of the *Bubu* are measured in such a way that the shape of the *Bubu* is symmetrically seen from various sides. This is because the *Bubu* maker wants the *Bubu* to be balanced and rigid. Based on the results of interviews regarding the reason for choosing the shape of *Bubu*'s structure to resemble a combination of spatial structures, it is believed that *Bubu*, when placed on the seabed, will be able to fight the current because of the pointed or triangular shape of the head so that the current cannot easily carry it away.

Measuring the Dimensions of the Bubu

To form *Bubu*'s whole shape, the maker first makes its net's part, namely the sides, in the form of several two-dimensional figures, including a hexagon, a combination of two congruent parallelograms (see Figure 3 below). Several rectangular sides are created as the other parts of its net to complete the whole construct.

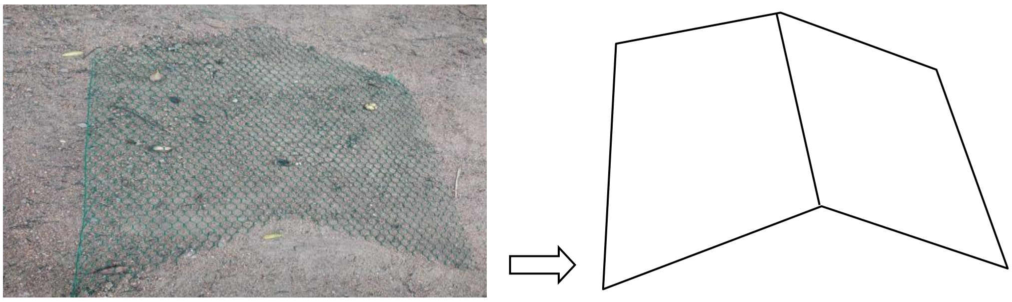

Figure 3. One of *Bubu*'s sides shows its six-sided character

To make several two-dimensional figures that function as sides of the trap, the trap maker uses the hole or circle on the wire net as a unit for measuring the dimensions of the length and width of the wire, which then become the sides of the trap. Length measurement is done by counting the number of circles horizontally and vertically, depending on which part of the plane the dimensions are to be measured. The process is shown in the following Figure 4.

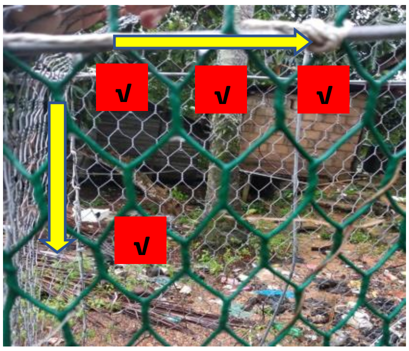

Figure 4. Using net holes in length measurement

By utilizing the holes in the wire netting as a unit of length measurement, the trap maker can decide what size or dimension of each two-dimensional figure acts as the sides of the trap. The holes used as non-standard units of measurement are called *mata* by the trap designer. In general, the dimensions of the *Bubu* that are built have dimensions of 15 *mata* thick, 35 *mata* wide, and 21 *mata* high. The size is obtained from several side dimensions of the trap shown in Figure 5 below.

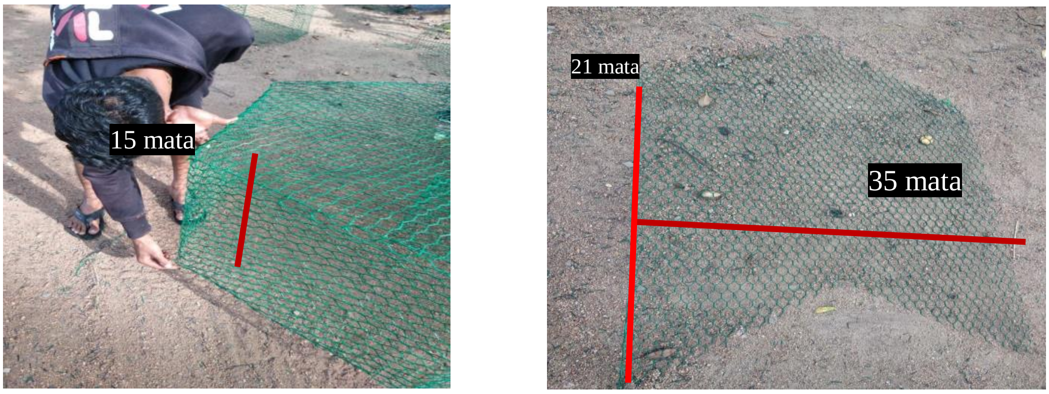

Figure 5. *Bubu*'s dimensions

Furthermore, all the two-dimensional figures on the trap sides are glued to each other using thick wire whose dimensions follow the length of each two-dimensional figure. These wires function like the edges of non-circular-sided three-dimensional figures and play a role in maintaining the integrity of the trap shape and strengthening the trap structure so that its shape persists on the currents of the seabed. Wire laying is also carried out on the edges of the trap and the side area. It is arranged so that the wire pairs form several congruent rectangular shapes, congruent right-angled triangles, and congruent right-angled trapezoids with a wire placement strategy, which will be explained later. The wire placement is shown in the following Figure 6.

Figure 6. *Bubu*'s final form

Meanwhile, the center's bottom formed a kind of entrance or door. This entrance serves as a fish trap road designed in the form of a parabola that opens downward with a maximum width dimension of 15 *mata*, as shown in Figure 7 below.

Figure 7. *Bubu*'s trap road

The exciting thing about determining the dimensions of the trap in terms of length, width, and thickness is the use of an odd number of *mata*, or the results of measuring the length and determining the number of holes are odd numbers. The manufacturer's particular reason for determining these dimensions is related to the laying of thick wire as a trestle for the side of the trap that is the center or benchmark. The thick wire is installed precisely in the vertical configuration of the wire holes. A thick wire is inserted in the vertical holes and tied in that position vertically so that it becomes firm and holds the sides in the middle. Thus, its position in the middle makes the left and right areas balanced. This balancing act through tactical placement recalls the similar function of a wire to a plane's axis of symmetry. The maker argues that, with the position of the wire in the middle, there are left and right areas on the front and back of the trap so that the left and right are balanced. This type of symmetry is known as bilateral symmetry, and it is reflective, with left-right benchmarks from the axis of symmetry. In addition, this shows the concept of balance through the same distance or number of holes concerning the axis of symmetry or holes in the middle wire. The wiring is illustrated in Figure 8 below.

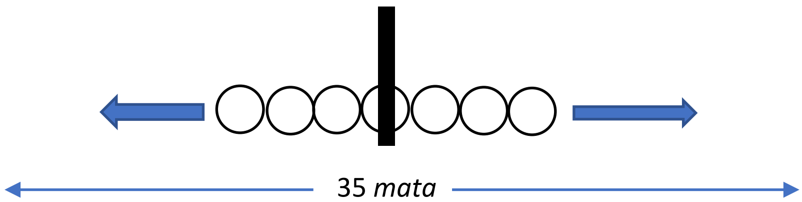

Figure 8. Installation strategy for thick wire on the net surface

The tactical character of the wiring is repeated to place another vertical wire on the side of the trap. Thus, with a trap width of 35 *mata*, the thick wire of the center is in hole 18. There are 17 holes to the left and 17 holes to the right of the guide wire on that side, so the maker can reassemble the wire vertically in the ninth hole sequence column, eight holes from the benchmark wire in the middle (axis of symmetry) and at hole 27, which is eight holes to the right of the benchmark wire. The following Figure 9 is an illustration of setting holes for thick wire installation.

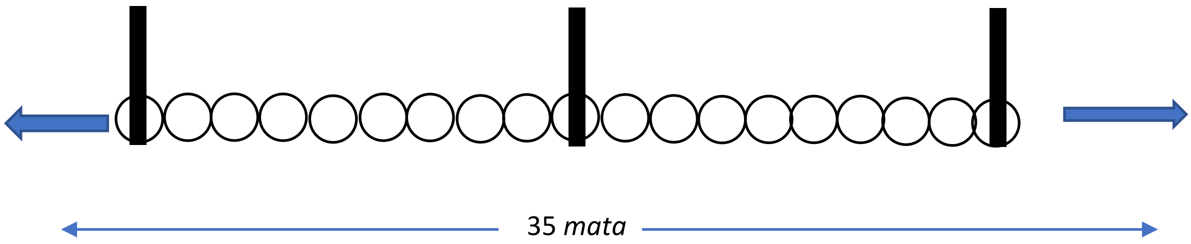

Figure 9. The repeated strategy of thick wire installation

If seen closer to the determination of the hole for installing the thick wire, it follows the particular mathematical concepts. The process is similar to determining the middle part of the sequence or the median of a sequence with an odd number of components. Finding the median, or middle part, of several segments of a sequence is similar to finding the quartiles of the sequence. This technique is similar to the technique of determining symmetry in figurative numbers in ancient Greece, precisely at the time of Pythagoras, around 6000 to 5000 BC. A figurative number is a geometric form of a number that can give birth to the concept of symmetry in the context of its use in ancient Greece. The technique is presented in Figure 10 below.

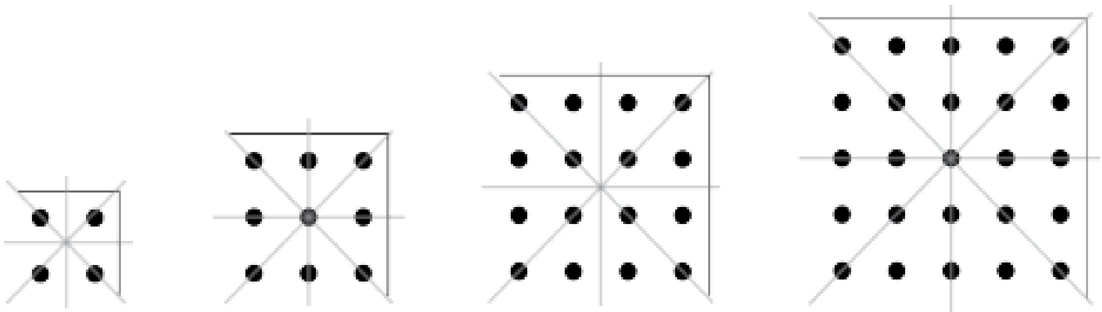

Figure 10. Symmetry axis on figurative numbers

The figure above shows a Greek figurative number consisting of several axes of symmetry. The group of figurative numbers represents odd numbers called "male" or "determined" because it has a square arrangement with four axes of symmetry. If seen carefully, the vertical symmetry that lies precisely in the center of the dot arrangement column is relevant to the determination of the hole in the placement of thick wire in the manufacture of the *Bubu* where the number of odd numbers is a measure of the length of the dimensions of the trap. In addition to figurative numbers, the strategy of placing thick wire right in the center hole resembles a geometric layout used to explore rules and patterns in numbers (Lipka et al., 2019). In Figure 11 below, symmetry characteristics are used in a group of geometric layouts as the basis for the number line, the concept of positive and negative integers, and the concept of distance from the starting point of zero.

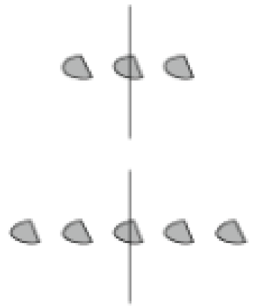

Figure 11. Geometrical symmetry layouts

Thus, in the determination process, the maker quickly points to the hole where the wire is installed while informing it of the serial number of the hole as a sign that the maker can easily find the benchmark hole based on the center reference hole (symmetry axis). At the same time, the authors seem to understand the relationship between several concepts, which are known formally in mathematics as bilateral symmetry axes and the equality character of left and proper distances, also known as reflection characters, odd and figurative number relationships, and their relation to symmetry properties and geometric layouts. Finally, the results of the study are captured in the following Table 2. The table gives an overview of how the purpose of the ethnomathematical study is achieved.

Table 2. Identified ethnomathematics in creating *Bubu*

Activities	Mathematical ideas, ways, techniques	Emerging mathematical concepts
Designing *Bubu* construct	- Determination of the basic shape of the trap as a whole and its parts - Characteristics of building space and the nature of balance and symmetry. - Setting trap line shape	- Non-circular-sided three-dimensional figures (cuboids and prisms) - The net of non-circular-sided three-dimensional figures - Parabola/curve
Counting	- Counting the number of wire holes as a length measurement unit - Determination of the position of the hole for installing thick wire in the surface area of the wire netting side of the trap with the concept of an axis of symmetry - Positioning the holes to maintain the idea of balance through the same distance or the results of horizontal length measurements to the left and right of the benchmark hole	- Odd numbers - Sequence, median, quartile - Bilateral symmetry and symmetry axis - Characteristics of figurative numbers - Congruence of plane figures

Activities	Mathematical ideas, ways, techniques	Emerging mathematical concepts
	(axis of symmetry)	
Measuring the length dimension of *Bubu*	- Measuring the dimensions of the length, width, and thickness of the *Bubu* using non-standard units of measurement (wire holes) and stating the results in units of *mata* - Measure the length of thick wire required based on the dimensions of the trap.	- Measurement of length with non-standard units

Based on the research results, there are several mathematical activities and several mathematical concepts that are rooted in the activity of designing and making fish traps. In determining the design of the *Bubu*, the designer chooses a combined form of several shapes and their parts by considering several aspects, such as balance and symmetry. This aims to produce a *Bubu* construct that is sturdy, strong, and resistant to shocks and currents while being placed on the bottom of the water. This primitive understanding shows that, naturally, humans can relate a structure or design to its relationship to the characteristics of balance and symmetry. As Euclid conveys in "The Elements," the elements of form and construct, as well as symmetry, describe the relationship that gave birth to the concept of balance because the property of symmetry can be applied in various fields, structures, or forms." (Heath, 1956)

Meanwhile, in measuring the dimensions of the trap, there is a measurement activity using a wire hole as a unit of measurement. In this case, the length of the trap is chosen in odd numbers with some considerations, such as the trap balance and the technical reasons for installing thick wire as a reinforcement for the trap construction. When viewed further, the selection of an odd number of holes in the context of wire installation in a wire mesh in the form of a hole provides an illustration of thinking that relates odd characters in the context of numbers and symmetrical properties like figurative number characters in ancient Greece and also geometric layouts as a strategy for planting the concept of odd numbers with the help of the axis of symmetry (Lipka et al., 2019). Furthermore, understanding symmetry is also related to a hole-fixing strategy for wiring, similar to finding the middle term of a sequence with an odd number of terms. The process repetition strategy also illustrates that, naturally, the trap designer has an understanding similar to determining the location of the quartile in the sequence as a continuation of determining the middle term.

With what has been found in the process of making the trap, especially in the measurement section as well as installing thick wire, the designer is said to have had a geometric sense through the concept of symmetry in looking at several things at once, namely measuring length dimensions, making calculations, and also having a sense of numbers, especially odd numbers. This follows the explanation that symmetry is closely related to one's understanding of the measurement of length, dimensions, and numbers (Lipka et al., 2019). Based on the results of the study, it can be concluded that symmetry is the dominant central concept found in the mathematical practice of making traps, which is the basis of two related activities, namely counting and measuring. This supports the argument that symmetry is a central mathematical concept that is the beginning of various mathematical practices (Constant, 2016). In addition, the study results show the same tendency toward the relationship of symmetry and measurements used in daily activities between the Kijang community, Bintan Regency, and the Yupiaq Eskimo community in Alaska and the Carolinian Islanders in Micronesia (Lipka et al., 2019). They apply fundamental mathematical principles related to symmetry and measurement in making tools to support daily activities.

In addition to the concept of symmetry, the study's results show that length measurement is also a dominant aspect in making traps. These results are similar to previous ethnomathematical studies where length measurement is the dominant aspect (Embong et al., 2010; Febrian, 2016; Utami et al., 2021; Febrian et al., 2022). This study provides detailed findings that are consistent with ethnomathematical research on fishing rods for residents of the Musi River and the Sero Fish Trap in Fakfak (Malalina et al., 2020; Ubayanti et al., 2016). This indicates that measurement, especially the length dimension, is an inseparable part of daily human activities.

Thus, the results of this study can provide information that mathematical activities and concepts exist in people's lives. Everyday phenomena can contain mathematical activities and concepts we may not realize we apply or have. This indicates that humans are naturally intellectual concerning mathematical matters. Knowing this makes it possible to change the pattern of teaching mathematics by utilizing everyday phenomena. It means that mastering mathematics more formally can be supported by everyday life phenomena, which are the starting point for its learning (Febrian et al., 2022). Therefore, ethnomathematics is a potential study for mathematics education. This is evidenced by some research results showing that integrating ethnomathematical studies in the mathematics learning process can facilitate students in expressing ideas, interests, understanding, and creativity (D’Ambrosio, 1999; Freudhental, 2006; D’Ambrosio, 2007).

CONCLUSION

The results of research on *Bubu* show that several mathematical activities and concepts are rooted in *Bubu*'s making. There are mathematical activities in designing, counting, and measuring length dimensions. In these activities, there are some mathematical concepts, including three-dimensional figures, the net of three-dimensional figures, curves, odd numbers, sequences with their attributes, bilateral symmetry, symmetry axes, figurative numbers, the congruence of plane figures, and length measurements with non-standardized units. The results showed that the *Bubu* maker already had a geometric sense through the symmetrical concept that became the basis for two activities such as counting and measuring, similar to the results of ethnomathematical research on the

Yupiaq Eskimo community in Alaska and the Carolina Islanders in Micronesia. The study's results also show that length measurement is a dominant aspect in making traps. This indicates that measurement, especially the length dimension, is an inseparable part of daily human activities.

Thus, the results of this study can provide information that mathematical activities and concepts exist in people's lives. Everyday phenomena can contain mathematical activities and concepts we may not realize we apply or have. This indicates that humans are naturally intellectual in mathematical matters. Knowing this makes it possible to change the pattern of teaching mathematics by utilizing everyday phenomena. It means that mastering mathematics more formally can be supported by everyday life phenomena, which are the starting point for its learning. Therefore, ethnomathematics is a potential study for mathematics education. Nevertheless, further research needs to be carried out to examine the potential upbringing of mathematics education.

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