

Research Article

Ethnomathematical Practices in Brackish Water Fishpond Systems: A Study of Informal Mathematical Reasoning in Buying and Selling Activities

Rhea Beth P. Depamayo¹ , Lorie Lyn P. Lallen^{1,*} , Juvyl M. Torres¹ , Stephen Raymund T. Jinon¹ , and Michelle P. Bales¹ 

¹ School of Graduate Studies, Iloilo State University of Fisheries Science and Technology, Philippines

* Correspondence: lorielynallen13@gmail.com

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Abstract: Ethnomathematics views mathematics as a culturally embedded human activity that emerges from everyday experiences rather than solely from formal classroom instruction. This study explored the ethnomathematical practices and informal mathematical reasoning of brackish water fishpond owners and caretakers engaged in buying and selling activities in Nanding Lopez, Dumangas, Iloilo, Philippines. This study is based on ethnomathematics theory and constructivist learning theory to study how mathematical knowledge is used, created, and interpreted in the context of fish trading and fishponds. This study used a qualitative case study design with three purposively selected fishpond owners/caretakers. Semi-structured interviews were conducted and data were analyzed using theme analysis. The results showed that participants frequently used estimation, measurement, categorization, proportional reasoning, mental computation and financial calculations in pricing fish, calculating quantities, estimating harvest outputs and managing income. These mathematical methods have been developed via the lived experiences, market conditions, environmental conditions, trust connections, and long-term commitment to fishpond activities. The study also indicated that mathematical knowledge is mostly gained through observation, apprenticeship, mentorship and continual engagement in livelihood practices rather than through formal education. Community engagement and experiential judgment help to strengthen the capacity of participants to give accurate estimates and to make good economic decisions. The findings show mathematics to be a practical, culturally embedded and socially created tool for sustaining livelihoods and family wellbeing. The study emphasizes the need of employing culturally relevant and real-world contexts in mathematics education so as to foster meaningful learning, engagement and mathematical literacy. Further research may examine ethnomathematical techniques in various livelihood settings to contribute to culturally responsive mathematics education.

Keywords: ethnomathematics, informal mathematical reasoning, fishpond operations, experiential learning, culturally responsive mathematics education, livelihood practices

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1. Introduction

Ethnomathematics is increasingly recognized as a useful perspective for understanding mathematics as a cultural and contextualized human activity. Rather than viewing mathematics only as a formal subject learned in school, ethnomathematics considers it a form of knowledge embedded in daily life and shaped by social practices, economic activities, and lived experiences. Within this perspective, mathematical thinking naturally develops through community interactions, livelihood activities, and everyday problem-solving situations (Payadnya et al., 2024). People often use mathematical reasoning without consciously applying formal mathematical rules. They estimate quantities, calculate costs, negotiate prices, compare values, and make financial decisions in their daily lives. These activities show that mathematics exists not only in classrooms but also in real-world situations.

Informal mathematical reasoning is the mathematical reasoning and problem-solving abilities that people gain from ordinary experiences rather than formal schooling. It comprises

practical skills such as estimating, mental calculation, measuring, comparing, recognizing patterns, proportional reasoning and decision making. Such reasoning is generally based on experience and local conditions rather than on formal mathematical techniques. Researchers have observed that informal mathematical reasoning is naturally developed through participation in daily activities and is a legitimate form of mathematical knowledge that assists people to solve practical problems and make decisions in real-life contexts (Jurdak, 2016; Saxe, 2012; Rosa & Orey, 2011). In livelihood-based communities it often expresses itself in activities such as pricing things, estimating quantities, managing resources, and analyzing economic prospects.

In the Philippine aquaculture industry, fishpond systems are more than just areas for raising fish; they are also important economic environments where mathematical thinking plays a vital role. Fishpond owners and operators regularly make calculations to estimate harvest yields, determine production costs, set selling prices, and manage financial risks in order to maintain profitable operations (Tolentino-Zondervan & Zondervan, 2022). In brackish water fishpond communities, particularly in Iloilo, these mathematical practices are deeply embedded in everyday livelihood activities and reflect the unique experiences and knowledge of local fishpond operators (Aquidado et al., 2025; Sulit et al., 2025).

Although ethnomathematics in fisheries and aquaculture has gained increasing attention, existing studies have largely focused on fish production, fishpond management, and general trading practices (Sulatra, 2023; Tolentino, 2025). Less attention has been given to understanding the specific mathematical reasoning employed by fishpond owners during daily buying and selling transactions, especially within brackish water fishpond communities (Rachmanto & Purwoko, 2019; Sulit et al., 2025). As a result, the practical mathematical knowledge that guides these economic activities remains underexplored.

Previous studies recognize the presence of informal mathematics in fish trading, but there remains limited understanding of how fishpond owners make pricing decisions, estimate quantities, and negotiate transactions using mathematical thinking. There is also a lack of research on how cultural practices and lived experiences influence these decisions. This gap is particularly evident in Iloilo's brackish water fishpond communities, where fish trading is both an economic and cultural activity. While Sulit et al. (2025) examined cultural mathematical practices in the community, their study focused mainly on geometry concepts and instructional materials rather than the actual experiences and reasoning processes of fishpond owners during buying and selling activities.

To address this gap, this study explores the ethnomathematical practices and informal mathematical reasoning of brackish water fishpond owners and caretakers involved in buying and selling activities. By examining their lived experiences, the study seeks to understand how mathematical thinking is naturally developed and applied within local fish trading systems.

This ethnomathematics is generally aimed at exploring the ethnomathematical practices and informal mathematical reasoning embedded in the buying and selling activities of brackish water fishpond owners and caretakers.

This research is aimed at answering the following main questions: (1) What mathematical practices and informal mathematical reasoning do fishpond owners use in pricing, estimation, quantity determination, and other fish trading activities? (2) What factors, cultural influences, and lived experiences shape the mathematical decision-making and practices of fishpond owners during buying and selling transactions? (3) How do fishpond owners describe and interpret the local mathematical knowledge they have acquired and utilized through their buying and selling activities? (4) How can these practices inform mathematics education?

2. Materials and Methods

This study utilized a qualitative case study. Qualitative case study is a research method that entails a detailed analysis of a delimited system (e.g., an individual, group, community, program, or phenomena) within its real-life environment. It aims to understand how and why a phenomenon occurs by collecting extensive information from a variety of sources such as interviews, observations, documents and artifacts (Creswell & Poth, 2018). Similarly, Yin (2018) described a case study as an empirical inquiry that analyzes a contemporary phenomenon inside its real-life environment, especially when the borders between the phenomenon and context are not readily obvious.

The present study used a qualitative case study design to explore the ethnomathematical practices of fishpond owners and caretakers involved in buying and selling operations in the brackish water fishpond communities. This study aims to investigate the mathematical

practices and informal mathematical reasoning utilized in trading activities such as pricing, estimation and determination of quantities. It also sought to study the causes, cultural influences and lived experiences that influenced the mathematical decision-making and practices of fishpond owners and caretakers during purchasing and selling transactions. Researchers collected participants' view-points on the meanings they gave to their mathematical knowledge through interviews and observations and examined how this information may contribute to mathematics education. The case study design enabled a deep understanding of the link between local culture, livelihood activities and mathematical thinking, by exploring these activities in their natural setting.

The study was conducted in selected brackish water fishpond communities in Iloilo, Philippines specifically in Nanding Lopez, Dumangas, Iloilo. The area was chosen because Iloilo is recognized for its vigorous aquaculture industry, notably milkfish (*bangus*) and other brackish water species.

The specific barangay was selected due to its accessibility, active fishpond operations, and willingness of the individuals to participate in the study.

The participants of this study were the three brackish water fishpond owners or caretakers who are actively engaged in buying and selling fish. Each respondent was assigned the general label "Fishpond Respondent (FR)" followed by a number (FR1, FR2, & FR3). All our respondents were residents of Barangay Nanding Lopez, Dumangas, Iloilo. FR1 is an active fish trader with twenty-nine years of experience in fish trading. FR 2 is a fishpond owner with thirty-one years of experience in fish trading. FR 3 is an active fish trader with at least five years of experience in fish trading. All our respondents were involved in regular buying and selling transactions and willing to share their experiences related to pricing, estimation, and computation practices.

The primary data gathering tool for the study was a semi-structured interview guide to explore the ethnomathematical practices of fishpond owners involved in purchasing and selling operations in brackish water fishpond systems. The interview guide includes open-ended questions to give the participants the room to freely describe and explain their experiences, practices and viewpoints on the use of mathematics in their everyday livelihood activities. Specifically, the questions address the mathematical procedures utilized in buying and selling fish, with attention to strategies used in pricing, estimating, measuring and computation.

The interview also investigated the participants' decision-making processes in their trading transactions; the cultural effects on their mathematical reasoning and the meanings and relevance they attached to their mathematical practices in the context of their livelihood. The semi-structured format of the interview allows participants to elaborate on their comments and discuss their experiences in detail, whilst ensuring that the important research questions and objectives of the study are effectively addressed. The format allowed the researcher to follow up with questions when further clarity or insight was needed, thus yielding rich and comprehensive qualitative data. Appendix A presents the semi-structured interview guide. At the same time, appendix B gives the letter to conduct an interview.

The data collection procedure of this study was done through a systematic sequence of procedures to assure ethical compliance, accuracy and richness of the collected data. First, a formal request was made to the barangay officials and fishpond owners in the designated localities for permission and approval. This will verify that the study has the appropriate endorsement and that access to the research site and participants is provided according to local protocols.

After receiving the required approvals, the participants were selected by purposive and snowball sampling. Individuals will be chosen based on some inclusion criteria about their engagement in fishpond trading activities. Other respondents may be proposed by the original respondents who fulfill the requirements. In this way, the study comprises people who have much experience in informal mathematical procedures in fish trade and whose experiences are important to the study.

All individuals consented to participate in the study before data collection. They were thoroughly informed about the purpose, procedures, risks and advantages of the study. Consent forms were employed to assure voluntary participation and pseudonyms were used throughout the study to maintain confidentiality and anonymity.

The main data collection instrument was individual semi-structured interviews, performed in a place convenient and comfortable for the participants. The interview will take between 30 to 60 minutes, and will be audio-recorded with the permission of the participant. This enables proper record keeping of responses and guarantees that no vital information is

missed in analysis.

At the end of data collection all audio recordings will be transcribed verbatim to guarantee information is accurate and full. The data was analysed through utilizing a thematic analysis. The researchers transcribed the interviews, highlight noteworthy statements, develop meanings, and cluster the meanings into themes that capture the core of the participants' experiences. The analysis centered on typical patterns of informal mathematical reasoning and cultural relevance of these practices in brackish water fishpond systems. The study included procedures such as member verification, triangulation, and observation to assure the reliability and trustworthiness of the findings.

This study focused on the lived experiences of brackish water fishpond owners and caretakers involved in buying and selling activities, particularly their use of informal mathematical reasoning in daily trading practices. It explores how participants apply mathematics in real-life situations such as pricing, estimating, weighing, computing profit, budgeting, and negotiating within fish trading transactions. The study was limited to three selected fishpond owners or caretakers in brackish water fishpond communities in Nanding Lopez, Dumangas, Iloilo, Philippines. The participants were chosen based on specific criteria: they must be active fish traders, have at least three years of experience in fish trading, and regularly engage in buying and selling activities.

This research used a qualitative case study design; thus, it focuses only on the participants' ethnomathematical practice, lived experiences and perspectives and does not aim to generalize findings to all fishpond operators in other areas. The data were gathered through semi-structured interviews. The study is further limited to qualitative data and does not include statistical analysis or quantitative measurement of mathematical performance. The study was also limited to fish trading activities within brackish water fishpond systems and does not cover other agricultural or commercial industries. Additionally, it only examined informal and practical mathematical reasoning used in daily transactions and does not evaluate formal mathematical instruction or curriculum-based mathematics learning.

The current investigation was conducted under rigorous ethical standards. Participants will be asked to give informed consent prior to participation in any data collection activities on a voluntary basis. The identity of the participants was kept anonymous to guarantee confidentiality. Any information collected will be utilized only for academic purposes to protect their privacy. In addition, the study was guided by the principle of non-maleficence because there will be no injury, inconvenience or disruption of the livelihood activities of the participants throughout the performance of the research. Furthermore, the researchers showed respect to the culture by respecting and valuing the participants' local practices, traditions and beliefs throughout the study.

3. Results and Discussion

This study indicated that mathematical thinking is anchored strongly on the daily livelihood activities of fishpond owners and caretakers. Participants showed how they used estimation, measurement, classification, proportional reasoning, mental computation and financial calculation in their everyday fish production and trade activities rather than relying on traditional school taught mathematics. These mathematical skills allowed them to estimate quantities of fish, to set prices, to classify fish by size and weight, to monitor production and to manage transactions efficiently. These findings emphasize that mathematics is not limited to the classroom but a functioning, necessary tool for decision making and economic survival in fishpond communities. These are consistent with the ideas of ethnomathematics which highlight that mathematical knowledge is culturally rooted and originates from practical experiences in particular social and vocational contexts (D'Ambrosio, 2016; Barton, 1996).

The discussion of the findings is organized into four interrelated themes: (1) Everyday mathematical practices in pricing, estimation, quantity measurement, and computations in fish trading and operations; (2) Mathematical decision-making in fish trading transactions; (3) Local mathematical knowledge as a tool for livelihood; (4) Experience-based informal mathematical knowledge in fishpond trading activities. Together, these themes illustrate how mathematical reasoning is embedded within the cultural, economic, and livelihood practices of fishpond communities.

3.1. Everyday Mathematical Practices in Pricing, Estimation, Quantity Measurement, and Computations in Fish Trading and Operations

The findings revealed that the fishpond owners and caretakers utilized practical mathematical reasoning in their daily operations of fish trade and fishpond management. Their mathematical knowledge is crucial to estimating the quantity of fish, classifying fish by size, determining market pricing, monitoring production, and calculating profit and output. Many respondents did not refer to these activities as “formal mathematics” yet the interviews revealed that mathematical ideas such as estimation, multiplication, ratio, measurement and financial computation are regularly used in real-life fishpond operations.

The results also revealed that these mathematical methods are experience-based and strongly contextualized in the fishpond environment. Key habits among respondents included fish classification by weight and size, mental calculations during harvest, and computations depending on the market price. Three interrelated mathematical practices emerged from the data: (1) size and weight-based computation, (2) practical estimation and calculation skills, and (3) mathematics for managing fishpond operations.

3.1.1. Size and Weight-Based Computation

One of the main results of this study is that fish pricing and harvesting are dependent on computation through size and weight, which exposes interesting informal mathematical reasoning in everyday fish trading. The fishpond responders classify fish according to the number of pieces per kilogram which determines the market value. This practice demonstrates an intuitive comprehension of ratios, unit rates, and proportional relationships typically taught in mathematical education.

FR 1 said, “*huo sa market pa na sya ginapresyohan... ugaling mga pareho na kun kis-a sa mga ... sa market da depende sa kadalagkuon ang maabot kun mga pareho na mga lima-isa, apat-isa... ti guru dira lang guru... kun sa mga Barotac o kun fishing port man presyo sina guru mga nobenta o shen ang pwersa na... tapos kun mga kwan na mga pareho bala mga tatlo-isa, lima-duwa amo na ang may purupresyo.. mga tag 140, 150... mga amo na ang presyo da sa palapala... basta gagmay merkado man ang presyo... depende sa sizes ka isda*” (In the market, usually it depends on the size of the fish... if they are five pieces or four pieces per kilo... the price would probably be around ninety pesos or one hundred... but if the fish are bigger... they are priced higher...). This illustrates how real-life pricing naturally follows proportional reasoning based on size to weight relationships.

Fishpond respondents also displayed numerical fluency in managing large amounts by multiplication of standardized weights. FR 2 explained how fish is calculated based on weight and crate measurement: “*kwan na kada kaba trayntay uno kilos bali per kaba ka nalang isip ka nalang kun mga tag shen kahas i times mo man na sa trayntay uno kilos*” (Each crate normally has 31 kilos of fish... if you have 100 crates, you just multiply that by 31 kilos and that’s how much it weighs). The above shows practical usage of ideas of multiplication and measuring in big scale estimate problems.

Beyond numerical computation, respondents also showed strong visual estimation skills, as they could already approximate fish size and quantity while the fish were still in the pond. Fishpond Respondents also demonstrated the ability to classify fish visually according to size. FR 1 shared: FR 1 stated: “*huo eh sa mga isda... ga langoy pa lang na balan na na namon kun pila isa na na eh*” (We are already aware how many pieces in a kilo, while they are swimming). Likewise FR 2 explained: “*lantawon mo deperensya gid na sila ya kadalagkuon nila... sa sizes man gihapon.*” (You notice the difference in their sizes... it’s really about sizing).

In general, these practices show the integration of measurement, ratio, multiplication and proportional reasoning learned via experience, highlighting the relevant embedding of mathematical concepts in real-world economic activities such as fish trade. The findings confirm the argument of D’Ambrosio (2016) that ethnomathematics arises from cultural situated activities where communities generate mathematical ideas to meet practical demands. Likewise, Barton (1996) highlighted that mathematical reasoning is incorporated in occupational tasks such as fishing. The findings further corroborate the conclusions of Rosa and Orey (2016) that informal economic sectors depend on practical arithmetic and estimating tactics rather than formal written computation. Recent study by Rosa & Orey (2025) also highlighted that integrating community-based mathematical knowledge into educational contexts strengthens learner’s appreciation of mathematics as a socially and culturally constructed discipline. Taken together, these studies affirm that the mathematical practices observed among fish vendors represent authentic forms of mathematical reasoning that are both culturally grounded and practically efficient, illustrating how everyday economic activities serves as a rich context for the development and application of mathematical concepts.

Figure 1 illustrates how fish are sorted and packed in crates where pricing and total

quantity depend on size classification (pieces per kilogram) and total weight per crate. This reflects the informal use of multiplication, estimation, and proportional reasoning in actual fishpond and market transactions.



Figure 1. Size and weight-based computation in fish trading operations.

Source: Original photos by the researchers.

3.1.2. Practical Estimation and Calculation Skills

Another important discovery is the employment of estimating and mental computation as fundamental mathematical practices in fish harvesting and selling operations. Participants reported that before weighing the fish, they normally estimate its weight and amount, indicating the presence of informal yet practical numeracy abilities incorporated in regular job routines. This practice was described by FR 1 as “*mata-mata*” saying: “*buo ma estimate mo man sa lawas sang isda.. buo mata-mata na...*” (We estimate it by looking at the body of the fish... it is *mata-mata* by eye). This reflects as an intuitive use of estimation strategies, where visual perception is translated into approximate quantitative judgment.

Such estimation is supported by extensive experience and frequent labor in fishponds. FR 1 further explains, “*ah ti eksperyensya gid na ang ga kwan.. ti kun sa kwan mga 29 years... baynti edad ko mo ti pira run ako kwarenta’y noybi...*” (Ah, that is really based on experience... because I have been doing this for about 29 years... I started when I was 20 years old, so now I’m already 49. This means that estimating is not a random guess, but a cognitive talent that has been formed over years of practice, observation and recollection. In this sense, mathematical understanding emerges as an experiential process where workers build internal benchmarks for weight, size and quantity over time.

The findings align the concept of situated cognition as presented by Lave and Wenger (1991), who argued that knowledge is developed by participation in authentic social practices. Mathematical thinking is not separate from work in fishpond communities but is developed by practical participation in harvesting and trade operations. The findings are also compatible with the ethnomathematics research that shows that workers in the local industry tend to employ mental calculation and visual estimation approaches rather than formal instruments (Rosa & Orey, 2011).



Figure 2. Practical estimation and mental computation in fish harvesting and trading (“*mata-mata*” technique).

Source: Original photos by the researchers.

Figure 2 shows fishpond workers visually assessing fish size and quantity before actual weighing. This reflects the use of experiential knowledge and long-term practice in estimating weight and output, demonstrating how mental computation and observation are used in real-

life decision-making during harvest and selling activities.

3.1.3. Mathematics for Managing Fishpond Operations

Mathematical thinking is firmly integrated in fishpond operations especially in computation, estimating, and unit conversion during harvest and trading activities. The fishpond respondents regularly employ mental and procedural mathematics consistently in estimating harvest weight, production output and income without constant reliance on formal measuring equipment. In their everyday work they see how mathematical ideas are used in real-life circumstances to control production and to help economic decisions.

FR 1 revealed how weight is calculated in real time with crates and trays: “*kun crates na ang kaba namon, panawag na namon kaba mo.... tag 33 kilos.. ti ga baw-as kami na kada sbento baynte ka ukon asta sa sbento sengkuenta.. mag sbento baynte na mga four tons na mo... mag sbento sengkuenta 5 tons na balan mo*” (Each crate is around 33 kilos.... we usually collect around 120 up to 150 crates. If it reaches 120 crates, that is already about four tons. If it reaches 150 crates, that is about five tons). Such practice reflects an applied understanding of unit conversion and scaling, which are key concepts in mathematics education.

FR 2 likewise explained how harvest output and total income are calculated: “*kun mga tag shen kahas I times mo man na sa trayntay uno kilos.. ti kun mag lima-duwa abi mag kwarenta kahas na itimes mo sa 31 amo ran tanan ka kilo ang kabilugan itimes mo sa presyo ka isda... Gina kwenta man na per kilo tanan kabilugan eh sa kinaha bala gina – kwanon mo na kun pila ka kaba kabilugan nga harvest moi times sa 31 kilos bala mabal a mo na dayun kun pila ka tons.. ka tinulada.. itimes mo dayun na sa presyo man eh...sa presyo man kun tagpila ang kilo...*” (All the fish are calculated per kilo. First you count how many crates you picked then multiply that times 31 kilos a crate so you can approximate the total tons. Then you multiply that by the price per kilo to find the total value). This method shows the use of multiplication, unit conversion and proportional relationship in the sequence to find the total production value. It points out the sequential operation of mathematical processes to simplify decision-making in economic activities with special attention on the estimation of market value and profitability. This illustrates that mathematical reasoning is an important aspect of pragmatic decision-making, especially when it is not possible to use formal measuring equipment to estimate total harvest weight. They use local measures like “*kaba*” and “*tinulada*” but these are conventional metrics, suggesting something easygoing but also regulated.

These results support the concept of contextual numeracy that emphasizes the use of mathematics in real-life work situations (FitzSimons & Coben, 2009). In addition, the Food and Agriculture Organization (FAO) (2022) mentioned that small-scale aquaculture operators usually lack proper access to formal weighing procedures and, thus, turn to estimation methods. The results are also consistent with the view of ethnomathematics that acknowledges indigenous measurement systems and mental computation as legitimate forms of mathematical reasoning adapted to local economic activity (D’Ambrosio, 2016; Shannon, 2021; Gerdes, 1996). Moreover, UNESCO (2023) highlighted that numeracy should be understood as a life skill developed through authentic social and economic experiences, reinforcing the importance of recognizing informal mathematical competencies in livelihood settings. Collectively, these studies indicate that the estimation and measurement practices observed among fish vendors are not merely intuitive but reflect well-developed mathematical reasoning shaped by cultural experience and practical necessity.

Figure 3 depicts fishpond workers harvesting fish using crates (“*kaba*”) and estimating total weights using standard measures per crate. This is an illustration of contextual numeracy, where workers rely on mental math and estimation based on experience to compute total production in kilos and tons.



Figure 3. Practical mathematical operations in fish trading transactions.

Source: Original photos by the researchers

The research demonstrate that everyday fishpond operations involve a range of interconnected mathematical practices, including estimation, measurement, multiplication, unit conversion, and proportional reasoning. Fishpond owners and caretakers apply these

skills to classify fish, estimate quantities and harvest output, determine prices, and calculate production value. Developed largely through repeated experience, these practices demonstrate how mathematical reasoning is naturally embedded in fish trading and fishpond management and serves as a practical tool for carrying out everyday livelihood activities efficiently.

3.2. Mathematical Decision-Making in Fish Trading Transactions

The second theme addresses decision making processes in fishpond management and trading. Fishpond owners and caretakers make significant decisions on harvesting, price and selling, based on market conditions and business ties. Participants mentioned some factors that influence decisions that include current market prices, competition among sellers, supply and demand, bargaining with buyers, and long-term trade relationships. These procedures do not necessarily demand significant mathematical calculations but they involve logical thinking, estimation, comparison and study of market trends to optimize profits and insure sustainability of their living. The research identified three significant variables, (1) market-based price competition, (2) trust and long-term buyer relationships, and (3) experience and experience-based judgment and decision-making.

3.2.1. Market-Based Pricing and Competition

Fishpond respondents emphasized that fish pricing is dynamic and constantly influenced by factors such as size, supply, competition, and market demand. FR 1 said competition has a direct impact on price and cited: “*Ab ti kompetensya... ma epekto gid na mabarat gid na... may kompetensya, manubo gid na ya ang presyo basta may kompetensya.*” (Competition affects the price because when there are many competitors the price really goes down). FR 2 added that pricing is often predestined based on size classification even prior to harvesting: “*Ab Antis kami na maghaw-as ginapapresyuban na na daan ang kwan mo ang kada size... ginapresyuban na na daad kun pila ang presyo antis namon harveston.*” (Fish are already priced by their size categories before we harvest them). Such methods represent an instinctive knowledge of the relationship between size and market value.

The results also show that fishpond respondents have an instinctive understanding of supply and demand as a proportional connection affecting market value. FR 2 said prices are higher in months of limited supply (e.g., January and December) and go down when fish are plentiful or when multiple operators are harvesting at the same time, “*Sa subung burubarat kay tig ililinit na... tagtalangla ka isda mo. Ti damu gid na ang ga kwan barato na... mga bula Enero mo na mahal, desyembre enero mo gid na ang mahal nga kinilo ka isda tungod kulang ang isda. Kun damu ang isda nagabaratu sya... kapin pa kun may kasabay ka gabarvest man amo ran bagsak dayun ya presyo... panubuy presyo pra nga kwan..para makuba nila ang isda...*” (Prices are very cheap because it is the hot season. The fish are small. Many fish are being harvested, so the price becomes low. The price is usually high around January to December because there is less supply of fish during that time. But when there is a lot of fish supply, the price goes down. It drops even more when many fishponds are harvesting at the same time, because competition forces the price down so buyers can get the fish...) This reflects an understanding of the inverse relationship between supply and price, as well as the impact of competition on market value. Such practices illustrate the use of proportional reasoning and informal mathematical modeling, where changes in variables such as supply, competition, and fish size directly influence price and income.

These findings are in line with those of the FAO (2022) which indicate that small-scale farmers usually acquire empirical knowledge of market swings so as to increase revenues and reduce losses. The results also support the findings of the Organization for Economic Co-operation and Development (OECD) (2019) that stressed the necessity of applying mathematical concepts such as relationships, variation, and decision-making to real-world economic issues.

Figure 4 illustrates fish vendors and buyers negotiating prices in a wet market setting where fish are classified by size and sold according to prevailing market conditions. Pricing is influenced by supply, demand, and competition among traders, reflecting adaptive economic decision-making and informal quantitative reasoning in real fish trading practices.



Figure 4. Market-based pricing and competition in fish trading activities.

Source: Original photos by the researchers.

3.2.2. Trust and Long-Term Buyer Relationships

Another significant finding of the study is the importance of trust and long-term buyer relationships, locally known as *suki*, in fish trading and marketing decisions. Fishpond respondents emphasized that successful transactions are not based solely on price but also on the reliability, honesty, and consistency of buyers. FR 1 said: “...ang importante ang *suki* kag ang *kwan* gid eh ang sa atun bala maayo... amo pa na ang isa maayo magbayad” (The most important thing is to have a regular buyer you can trust and who treats you well). Likewise, FR 3 highlighted the value of maintaining loyal customers, stating: “...Ang *dugay* (customer) amo gid ang ginatutukan namon.. kay ang *dugay* amo ang permanente gid ya sige sige sugot sa presyo namon mo kumbaga *suki* nagid sila ya.” (The long-term customers are really the ones we focus on because they are the permanent ones who continuously agree with our prices. In other words, they have already become our regular loyal customers).

The results also indicate how mathematical thinking is used in comparison, evaluation and prediction. Fishpond respondents rate past purchases, predict possible sales possibilities and assess the economic value of retaining long-term buyers. These are the same processes taught in the mathematics classroom: examining patterns, interpreting data, considering alternatives, making reasoned judgments based on evidence. The *suki* system is a concrete example of how mathematics can be useful in decision making beyond computation in this respect, emphasizing the importance of mathematical reasoning in the management of sustainable economic connections and the long-term stability of business. This implies that economic choices in fishpond communities are determined not only by calculation and profit, but also by social interaction and trust. This phenomenon echoes Filipino relational economic practices, especially the concept of *suki* systems based on reciprocity, loyalty, and long-term trust ties in local business (Jocano, 1998).

Figure 5 shows fish vendors and regular buyers engaging in repeat transactions at a local market. These interactions reflect the importance of trust, loyalty, and long-term relationships in pricing agreements and decision-making, where “*suki*” customers are given priority and stable pricing agreements based on mutual understanding and sustained economic ties.



Figure 5. Trust and long-term “*suki*” relationships in fish trading decision-making.

Source: Original photos by the researchers.

3.2.3. Experience-Based Judgment and Decision-Making

The study showed that long-term experience is an important role in mathematical decision making. According to responses from fishponds, years of constant practice and observation have enabled them to acquire the skill to estimate amounts, classify fish, and make correct production decisions. FR 1 pointed out: “*ah ti eksperyensya gid na ang ga kwan... ti kun sa kwan mga 29 years ...*” (Experience matters a lot... we can make correct estimates already, because we have been doing this for many years), while FR 2 noted that experienced harvesters can efficiently classify fish according to size and quality, indicating that such competencies become internalized through prolonged participation in the occupation:

“...*tanang man nga mga bugador kabalo namn sa punong mo.. ang mga bugador na ya ang mga ga harvest bala... amo rang gabarvest.*” (It’s something all the fish harvesters know how to do). This supports the view of mathematics as a practical and contextualized discipline that is learned not only through formal instruction but also through participation in everyday practices. The results implies that mathematical competence in fishpond communities is built up informally through apprenticeship, observation and engagement in communal labor practices. This is consistent with the experiential learning theory which suggests that knowledge is generated through concrete experience and reflective practice (Kolb, 2015). It also indicates the social transmission of ethnomathematical knowledge among occupational communities (D’Ambrosio, 2016; Shannon, 2021).

In addition, fishpond respondents also described how environmental conditions influenced production decisions. FR 3 highlighted how seasonal conditions influenced decisions on fish production: “*paryas ni magtig ululan indi man kemi ni ka pagwa ka similya gid kay puro tabang.. gabatyag man ang similya namon sa tabang mo.. kun tag-irinit ok lang kay pabor na sa amon...kapin pa kun tubig sa tag adlaw pabor gid na sa amon similya...*” (During rainy seasons we cannot produce fingerlings because the water becomes too fresh... during hot weather, it is okay because it is more favorable). These findings are examples of pattern identification and predictive reasoning, where fishpond respondents identify patterns of environmental conditions that occur repeatedly to forecast outcomes and make suitable management decisions. Evidence from the environment indicates aquaculture productivity is very susceptible to changes in water salinity and temperature and requires adaptive management solutions (Edmondson & Fanning, 2022). Farmers’ experiential forecasting is a kind of informal data interpretation, which is consistent with scientific environmental monitoring. Climate variability is a key determinant of aquaculture productivity, and fish producers need to be aware of the environment and adjust accordingly (FAO, 2022).

Furthermore, fishpond respondents emphasized the importance of community-shared knowledge in understanding market changes. FR 1 shared: “...*bal-an mo ang presyo indi nga kuon ga steady.. gasaka gapanaog.. pareho na kun damu abi.. indi lang sa amon punong gabaw-as may ara man sa iban.*” (It’s not fixed price, it’s determined on the volume of the harvest and the market conditions). The respondent also commented that market knowledge is commonly communicated through informal communication networks: “...*kun kis-a burubalita lang ran kanamon nga ang presyo am oni..ang presyo kang gab-i shento traynta pagsunod ruman shento dyes ruman sa sunod...*” (Sometimes, we only learn through word of mouth that the price is like this.... (For example, tonight the price is 130, then next time it’s 110, then it changes again after that...)) These activities show the utilization of data collection, trend analysis, and decision-making based on developing data. These are tasks that are indicative of interpreting shifting data, analyzing quantitative trends and making informed decisions under varied settings.

In conclusion, the findings suggest that experience-based judgment in fishpond societies entails the persistent application of mathematical processes such as estimation, categorization, pattern recognition, prediction, data interpretation and decision-making. These skills, built over years of practical experience, highlight the way that mathematics is a lived, contextualized knowledge that underpins economic and environmental decision making in the day-to-day running of fishponds. This means that mathematics is used in informal economic forecasting and estimation based on the flow of information in a community. This is in line with Jurdak (2016) who describes informal mathematics in economic contexts as often informed by social interaction and market experience rather than formal calculation. Moreover, Saxe (2012) notes that numerical thinking in commerce arises through participation in culturally entrenched economic systems.



Figure 6. Experience-based judgment and decision-making in fishpond harvesting activities.

Source: Original Photos by the researchers.

Figure 6 shows experienced fish harvesters collaboratively sorting and assessing fish during harvest operations and observing environmental conditions to guide production

decisions. It highlights how long-term practice and apprenticeship enable workers to make accurate judgment in classifying fish and organizing harvest activities without formal measurement tools.

The findings demonstrate that mathematical decision-making in fish trading extends beyond numerical computation and involves comparison, prediction, pattern recognition, data interpretation, and logical reasoning. Fishpond owners and caretakers consider changing market prices, supply and demand, competition, environmental conditions, and long-term buyer relationships when making decisions about harvesting, pricing, and selling. These practices, strengthened through years of experience and community-shared knowledge, show how mathematical reasoning is integrated with economic judgment, social relationships, and environmental awareness to support informed and sustainable livelihood decisions.

3.3. Local Mathematical Knowledge as a Tool for Livelihood

The results revealed that the owners and caregivers of the fishpond saw mathematics as an essential tool to their livelihood and learning experience. Their mathematics skills are not learned from formal education but are generally acquired from direct experience in fishpond activities, watching experienced workers and constant involvement in the trading sector. Mathematics was expressed by participants as a useful instrument that is helpful for family livelihood, strategic decision making and learning through practical application. Consequently, one prominent subtheme emerged from the analysis – mathematics as a pillar for daily livelihood.

3.3.1. Mathematics for Daily Livelihood and Family Support

The results indicate that fishpond trading mathematics is not only a technical calculation but also an essential tool in protecting everyday living and family welfare. Fishpond operators stressed that the mathematical techniques used for fish production, harvesting, pricing and income management are directly responsible for fulfilling the needs of their families and securing their families' future. As FR 3 emphasized, mathematical habits are related to economic survival and family support indirectly: “...sa amo ni nga kwan indi ka man magulpihan makatibawas gid luwas nalang kun mapatapos mo mga bata mo ti dira ka nalang sandig.. bali amo ni nga pangabuhì pangsupport na lang sa imo mga bata kag sa pang adlaw-adlaw.” (...in this kind of livelihood, you cannot really become suddenly rich. You can only gradually improve your situation, especially if you are able to help your children finish their studies, that is what you hold on to. Basically, this livelihood is what supports your children and your daily needs). This statement demonstrates the intimate relationship between the outcome of mathematical decisions made for fishpond operations and the survival of families, educational opportunities, and long-term economic stability. Some official reports (OECD, 2019) show relevance of numeracy skills is highly correlated with financial resilience and improvement of the livelihood in informal labor sectors. Mathematical thinking is an important ability in rural countries for budgeting, income management and promoting slow economic growth (Kyeyune & Ntayi, 2025). Financial literacy and informal numeracy are important for the sustainability of rural livelihoods and for reducing economic vulnerability (Czech et al., 2024).

Figure 7 illustrates how income from fishpond operations is used for daily household needs and the education of children. It reflects the role of informal numeracy in budgeting, income allocation, and long-term financial planning, showing how mathematical thinking in fish trading directly contributes to economic stability and family welfare in rural communities.



Figure 7. Mathematics for livelihood and family support in fishpond communities.
Source: Original photos by the researchers

It was found that local mathematical knowledge serves as an essential tool for sustaining the livelihoods of fishpond communities. Mathematical reasoning supports fish production, harvesting, pricing, income management, and the allocation of resources for everyday household needs and children's education. These practices show that mathematics has

practical value beyond computation, contributing directly to family welfare, financial resilience, and long-term economic stability.

3.4. Experience-Based Informal Mathematical Knowledge in Fishpond Trading Activities

This theme emphasizes how mathematical knowledge of fishpond owners and caretakers is formed, refined, and communicated through lived experiences in the real operations of fishponds. It emphasizes that mathematical knowledge is not primarily learned through formal classroom instruction, but continually shaped by observation, participation, apprenticeship, and engagement in everyday trading and production activities. This issue also considers the role of experiential learning, apprenticeship and community involvement in the acquisition of practical mathematics abilities such as estimating, computation, measurement and decision-making in real-life situations.

3.4.1. Learning Through Experience and Observation

The results indicate that the mathematical knowledge of the fishpond workers was primarily built on their concrete experiences, observations and participation in real fishpond activities. Respondents stressed that younger workers acquire the required mathematics abilities by observing experienced fishpond owners/caretakers and become proficient by gradually becoming involved in daily operations. As FR 2 said: *“Gapangita man sila ka du kabalo maghandle sang punong dasun amo ran pamangkuton nila gaobserve sila (ang mga mas bata nga manugpunong).”* (They are also looking for people who are very good at running a fishpond... They look at the senior fishpond workers. It is the younger ones who always make inquiries). This means that mathematical ideas like as estimate, counting, measurement, pricing and computing are not essentially taught in the classroom. Rather they are learnt by doing in a real work place. This supports the concept of contextual learning as articulated by Lave and Wenger (1991) where knowledge is acquired through membership of a “community of practice”. Moreover, Kolb (2015) emphasizes that experiential learning is not a passive teaching process, but one of active participation, reflection and application.

Another important finding is the role of mentorship and information transfer between generations for the development of mathematical competence. More experienced fishpond owners/caretakers closely monitor less experienced personnel in harvest calculations, pricing, fish classification and operational choices. FR 3 related: *“...bali pagsulod ko bantay sya gid ni nagtraining sakun.. Helper lang kami sang una sa ila sang pagpasulod nya sakon bantay...”* (...when I came in, he was the guy that trained me. Our helper was the first to notice them entering we all watched... I was only an assistant then...) This indicates that mathematical understanding is transferred through apprenticeship, modelling and directed involvement rather than formal instruction. Rogoff (2011) points to the significance of guided involvement in cognitive development in indigenous and community settings, stating that learners gain abilities through collaborative activities with more knowledgeable others. Similarly, Gonzalez et al. (2005) indicate that the ‘funds of knowledge’ of communities are resources to be utilized for informal learning. Similarly, Anugraheni (2025) argued that everyday mathematical knowledge develops through social interaction, shared work experiences, and community participation, highlighting the importance of recognizing informal learning environments as legitimate sites of mathematical development. And figure 8 shows younger fishpond workers observe and learn in fishpond harvesting and trading practices.



Figure 8. Learning through experience and observation.

Source: Original photos by the researchers.

3.4.2. Real-life Learning for Mathematics Education

A significant theme that occurs is the idea that mathematics is best acquired by direct

experience. Fishpond respondents consistently emphasized that meaningful learning occurs when individuals engage in actual tasks rather than merely receiving information. FR 1 explained: “...*mas makabalo ka gid kun na experience or ginahimo mo mismo makalearn ka gid... actual gid... ambun mo ni ambun mo ni... step by step...*” (You really learn more when you experience it yourself or actually do it. That is when real learning happens... actual, hands-on experience... like this, then this... step by step). This perspective emphasizes the role of experiential learning in the construction of mathematical understanding, whereby knowledge is built up by active involvement with real-life circumstances.

FR 2 also emphasized the importance of observation and participation in the learning process and that younger people learn faster if they are exposed to real-life experiences: “*Kun mayo manilag ang bata ehb (mas maka learn sya)... kun ga observe sya dasig sya makabalo eh... mas dasig sila makaintindi or makabalo kun sila maka experience man.*” (If the students or younger people watch and obtain experience, they learn faster. (They understand better and faster when they are exposed to actual hands-on experience). This was repeated by FR 3: “...*Kun kwan lang indi ma experience indi man na matunan...*” (If they just know about it but do not experience it, they will not learn it). The result suggest that learning is enhanced when individuals are given opportunities to apply concepts, test ideas, and develop understanding through authentic experiences rather than through passive instruction alone. This suggests that, by connecting classroom lessons to authentic livelihood activities, educators can help learners recognize the relevance of mathematics in everyday life while promoting deeper conceptual understanding.

Results show that fishpond owners and caretakers consider experiential learning a useful strategy for teaching mathematics. Their experiences suggest that mathematics learning improves when students are engaged in real-world tasks that involve estimating, measurement, computation, and decision making. Such authentic learning activities give excellent chances for the development of mathematical literacy and meaningful links between the mathematics of school and the mathematics of everyday life. These ideas are in close agreement with experiential learning theory which holds that knowledge is constructed by actively participating in real world tasks (Kolb, 2015). In short, fishpond operators are promoting a learning model in which pupils undertake real activities such as estimating, pricing and measuring. This is supported by research demonstrating contextualized mathematics training increases conceptual understanding and memory (Boaler, 2016; Berry & Larson, 2019). Students involved in tackling real-world problems are more engaged and perform better in arithmetic.

Table 1 presents the mathematical practices identified from the respondents and their corresponding alignment with the Mathematics learning competencies of the Department of Education. The findings demonstrate that the informal mathematical knowledge used in fishpond operations reflects competencies expected in the K-12 Mathematics Curriculum, particularly in estimation, measurement, computation, reasoning, and problem-solving.

Table 1. Mathematical practices in fishpond operations and their alignment with mathematics learning competencies.

Mathematical practices	Mathematical concepts involved	Related DepEd mathematics learning competencies
Estimating fish size, weight, and quantity through <i>mata-mata</i> (visual estimation); determining fish per kilogram	Estimation, measurement, approximation, number sense	Estimates quantities and measures in real-life situations; applies appropriate measurement strategies to solve problems
Computing harvest weight using crates (<i>kaha</i>), converting kilograms to tons, calculating total harvest output	Multiplication, division, unit conversion, operations on numbers	Performs computations involving whole numbers and decimals; converts units of measure and solves related problems
Determining fish prices based on size and weight; calculating total income from harvests	Financial literacy, multiplication, ratio, problem-solving	Solves problems involving business mathematics, profit, cost, and consumer transactions
Adjusting harvest schedules and pricing based on supply, demand, competition, and environmental conditions	Data interpretation, proportional reasoning, prediction, logical reasoning	Analyzes patterns and relationships; uses mathematical reasoning to make informed decisions in real-life situations
Learning estimation, pricing, and fish classification through observation, apprenticeship, and hands-on experience	Pattern recognition, reasoning, applied mathematics, problem-solving	Applies mathematical concepts in authentic contexts; demonstrates understanding through real-world problem-solving and investigation

We found that informal mathematical knowledge in fishpond communities is developed and strengthened through experience, observation, apprenticeship, and active participation in everyday activities. Skills such as estimation, measurement, computation, classification, and decision-making are acquired through hands-on practice and interaction with more experienced members of the community. These findings highlight the value of experiential and contextualized learning in mathematics education, suggesting that connecting mathematical concepts with authentic livelihood activities can promote meaningful understanding and demonstrate the practical relevance of mathematics in everyday life.

Taken together with the findings across the preceding themes, these results provide a broader understanding of how mathematics functions within fishpond communities. Mathematical knowledge is deeply embedded in everyday livelihood practices and is shaped by practical, economic, environmental, and social conditions. Across the identified themes, fishpond owners and caretakers demonstrated mathematical reasoning through estimation, measurement, computation, proportional reasoning, pricing, prediction, and decision-making. Importantly, these findings show that informal mathematical knowledge is not separate from academic mathematics but represents a contextualized and culturally grounded application of mathematical concepts to authentic situations. In this sense, fishpond activities provide a meaningful context in which mathematical knowledge is acquired, refined, and applied to solve practical problems, support family livelihoods, respond to changing market and environmental conditions, and make informed economic decisions. Recognizing such ethnomathematical practices in mathematics education can therefore help bridge the gap between school mathematics and learners' everyday experiences, making mathematical concepts more relevant, meaningful, and applicable to their lives.

4. Conclusions

The study indicates that mathematical thinking is inherent on the daily livelihood practices of fishpond owners and caretakers. Here, mathematics is not seen as an abstract school topic but a real and necessary tool for the management of fish production, trading and household survival. The participants consistently used estimation, measurement, classification, proportional reasoning, mental computation and financial calculation in real life fishpond operations. These activities are at the heart of finding fish size and weight, predicting the yield of a catch, calculating income, fixing pricing and managing transactions. This shows that mathematics is a lived and culturally located practice that underpins both economic productivity and sustainability.

The learning techniques by which fishpond operators build their mathematical skills are mostly informal and experiential. Instead of formal instruction, individuals develop mathematical skills through observation, apprenticeship, mentorship and continual participation in actual fishpond operations. Long-term practice and community participation and experience-based judgment increase their capacity to estimate, compute and make appropriate economic decisions. Furthermore, environmental awareness and market familiarity are involved in their capacity to predict and analyse informally. Trust-based relationships and market dynamics influence the enactment of mathematical decisions in real trading circumstances. This underscores the social and cognitive nature of mathematics cognition in fishpond societies.

These findings have important implications for mathematics education, particularly the value of experienced, contextualised and culturally relevant teaching techniques. The lived experiences of fishpond operators reveal that a meaningful mathematical understanding is developed when learners are engaged in authentic tasks such as estimating numbers, measuring outputs, calculating costs and addressing real world problems. Integrating community-based information and real-life circumstances into classroom education can improve learners' conceptual understanding, engagement and mathematical literacy. In conclusion, the study shows that math is always being built and improved by common livelihood practices, affirming its significance as a discipline of the academy and a tool for economic and social life.

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Informed Consent Statement: Permits, informed consent and data privacy agreements were obtained from all subjects involved in the study.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A. Semi-structured interview guide.

Statement of the problem	Interview guide (translation)
1. What mathematical practices and informal mathematical reasoning do fishpond owners use in pricing, estimation, quantity determination, and other fish trading activities?	1. Can you describe your usual process of buying and selling fish in your fishpond? Probe: Can you show an example of how you estimate fish quantity or compute profit during selling? What computations do you do most often during transactions? (<i>Paano ang proseso sang pagbakal kag pagbaligya sang isda sa inyo fishpond? Probe: Pwede mo mabatang ang isa ka balimbawa kung paano mo ginasukot ukon ginatantiya ang kadamuon sang isda ukon paano mo ginacompute ang ginansya sa pagbaligya? Ano nga mga kwenta ukon pagcompute ang permi mo ginahimo kada transaksyon?</i>)
2. What factors, cultural influences, and lived experiences shape the mathematical decision-making and practices of fishpond owners during buying and selling transactions?	2. How do you estimate fish weight or quantity when selling without exact measuring tools? Probe: How do you know if your estimate is accurate? What signs or experiences help you estimate correctly? Do you compare your mental calculations with actual measurements? (<i>Paano mo ginatantiya ang kabugaton ukon kadamuon sang isda kon wala sang eksakto nga timbangan ukon panukot? Probe: Paano mo mabalan nga sakto ang imo pagtantiya? Ano nga mga palatandaan ukon eksperyensya ang nagabulig sa imo para para makasakto sa pagtantiya? Ginakumparar mo bala ang imo nga mental nga kwenta sa aktwal nga sukot ukon timbangan?</i>)
3. How do fishpond owners describe and interpret the local mathematical knowledge developed through trading activities?	3. What factors influence your decision when accepting or rejecting a buyer's offer? Probe: Does your relationship with buyers affect your pricing decisions? How do competition and market trends affect your computations or estimates? Do you sometimes prioritize long-term relationship profit? (<i>Ano nga mga butang ang nakaapekto sa imo desisyon kon batonon ukon indi batonon ang presyo nga ginabatag sang buyer? Probe: Nakaapekto bala ang imo relasyon sa buyer sa pagdesisyon sang presyo? Paano nakaapekto ang kompetensya kag presyo sa merkado sa inyo pagkwenta ukon pagtantiya? May mga tion bala nga mas ginapili mo ang maayo nga dugay nga relasyon imbes nga daku dayon nga ginansya?</i>)
4. How can these practices inform mathematics education?	4. Do your experiences, traditions, or community practices influence how you compute or decide prices? In what way? Probe: Who taught you these methods of pricing or estimation? Are these practices common among fishpond owners in your community? How do younger fishpond owners learn these methods? (<i>Nakaapekto bala ang imo mga eksperyensya, kinaandan, ukon mga pamaagi sang komunidad sa paano kamo magkwenta ukon magdesisyon sang presyo? Paano? Probe: Sino ang nagtudlo sa inyo sang sini nga mga pamaagi sa pagpresyo ukon pagtantiya? Komon bala ini nga mga pamaagi sa mga tagiya sang fishpond sa inyo komunidad? Paano man nakatuon ang mga mas bata nga tagiya sang fishpond sini nga mga pamaagi?</i>)
	5. Why are these mathematical practices important in your daily life? Probe: What do these skills mean to you as a fishpond owner? How have these practices helped you survive or succeed in your livelihood? (<i>Ngaa importante ini nga mga pamaagi sa pagkwenta sa inyo adlawadlaw nga kabuhi? Probe: Ano ang kabulugan sini nga mga skills para sa imo bilang tagiya sang fishpond? Paano kamo nabuligan sini nga mga pamaagi para makapadayon ukon magmadinalagon sa inyo pangabubian?</i>)
	6. Can you describe the local ways or practical methods you use in counting, estimating, measuring, or computing during buying and selling activities in your fishpond operations? Probe: What lessons from fish trading can teachers use in teaching mathematics? Do you think students learn mathematics better when lessons come from real-life experience? What examples from fishpond operations are useful in teaching counting, estimation, or computation? (<i>Mabimo mo bala maistorya ang mga lokal nga pamaagi ukon paraktikal nga paagi nga imo ginagamit sa pagtantiya, pagsukot, ukon pagkwenta sa pagbakal kag pagbaligya sa inyo fishpond? Probe: Ano nga mga leksyon halin sa pagbaligya sang isda ang pwede magamit sang mga maestro sa pagtudlo sang Matematika? Sa inyo hunahuna, mas dali bala makatuon ang mga estudyante sang Matematika kon balin sa tinuod nga eksperyensya ang leksyon? Ano nga mga balimbawa halin sa fishpond operation ang maayo gamiton sa pagtudlo sang pagbilang, pagtantiya, ukon pagkwenta?</i>)

Appendix B. Letter to conduct an interview.

 Republic of the Philippines
ILOILO STATE UNIVERSITY OF FISHERIES SCIENCE AND TECHNOLOGY
OFFICE OF THE SCHOOL OF GRADUATE STUDIES
Tiwi, Barotac Nuevo, Iloilo | email: sgs@isufst.edu.ph 

May 18, 2025

DR. JOANA PAULA B. BIÑAS
Director, School of Graduate Studies
This University

Dear Dr. Biñas:

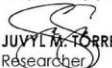
Greetings of peace and goodwill!

We, the undersigned graduate students of the Master of Arts in Education Major in Mathematics enrolled in the Ethnomathematics course, are currently conducting a study entitled:
"Ethnomathematical Practices in Brackish Water Fishpond Systems: A Study of Informal Mathematical Reasoning in Buying and Selling Activities" as part of our academic requirements.

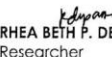
In line with this, we respectfully seek your permission to conduct an interview and gather data with fishpond owners/caretakers located in Barangay Nanding Lopez, Dumangas, Iloilo. This activity aims to gather first – hand information and meaningful insights into local fishpond operation and practices particularly in buying and selling activities, and understand the practical and informal mathematical reasoning in daily transactions and decision-making practices of fishpond owners. The purpose of this interview is purely academic, and all data gathered will be treated with confidentiality and will be used solely for educational purposes.

We sincerely hope for your favorable approval and support regarding this request. Thank you very much for your valuable time consideration.

Respectfully yours,


JUVYL M. TORRES
Researcher


LORIE LYN P. LALLEN
Researcher


RHEA BETH P. DEPAMAYLO
Researcher

Noted:


STEPHEN RAYMOND T. JINON, PhD ScEd
Course Facilitator

Approved:


JOANA PAULA B. BIÑAS, PhD Ed
Director, School of Graduate Studies

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