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Ethnomathematics in the Maapam Tradition: Exploring Authentic Numerical Practices in West Pasaman

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Abstract: This study explores authentic numerical practices and numeracy embedded in the Maapam tradition of West Pasaman through an ethnomathematical lens. The Maapam tradition is a communal cultural practice involving the preparation, cooking, and sharing of traditional cakes called apam. Using a qualitative ethnographic approach, data were collected through direct observation and semi-structured interviews with community members who actively participate in the tradition. The findings reveal that Maapam involves various forms of mathematical and numeracy reasoning that occur naturally within everyday cultural activities. In particular, proportional reasoning and numerical scaling are demonstrated when determining the composition and quantity of ingredients according to the desired amount of apam. Practical arithmetic and budgeting are also evident during the procurement of ingredients, including estimating quantities, calculating costs, comparing prices, and managing available resources. Furthermore, spatial and numerical measurement can be observed through the use of circular molding tools, including considerations of size, diameter, quantity, and distribution. These practices demonstrate that numeracy is not merely an academic construct learned in formal educational settings but also a lived cultural competence developed through meaningful communal activities. Integrating the Maapam tradition into numeracy education can provide a culturally responsive learning context that connects abstract numerical concepts with students' everyday experiences and local environment. Such integration may strengthen students' numerical reasoning, problem-solving abilities, and understanding of mathematical concepts while simultaneously fostering cultural awareness, appreciation, and respect for local traditions. Therefore, Maapam represents a valuable ethnomathematical resource for developing meaningful, contextual, and culturally relevant numeracy learning in contemporary educational contexts.

Keywords: Contextual numeracy; Ethnomathematics; Maapam tradition; Numeracy; Numerical practice.

Introduction

Numeracy is a fundamental discipline crucial for developing logical, analytical, and problem-solving skills (Suherman & Vidákovich, 2025). However, students frequently perceive it as an abstract and difficult subject, primarily because instruction often emphasizes the rote memorization of formulas and procedures rather than connecting numerical concepts to students' real-world experiences. Consequently, students struggle to comprehend numerical concepts and apply them in daily life (Payadnya et al., 2024). This disconnect is starkly reflected in the 2022 Programme for International Student Assessment (PISA) results, where Indonesian students scored 366 in numeracy, significantly below the OECD average of 472. These findings underscore the urgent need to implement meaningful, contextual numeracy learning that bridges abstract concepts with students' lived experiences (Ramadhani et al., 2025).

Ethnomathematics offers a promising approach to bridge this gap by exploring the numerical ideas and practices embedded within cultural contexts (Payadnya et al., 2026). Rather than viewing numeracy solely as a formal academic discipline, this perspective recognizes it as a cultural product encompassing cognitive activities

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such as counting, measuring, classifying, and reasoning (Da Silva, 2026). In contemporary educational discourse, this aligns closely with the concept of *numeracy*—the ability to apply numerical, proportional, and spatial reasoning in everyday contexts. By framing cultural practices through the lens of authentic numerical practices, educators can create highly responsive and culturally sustaining learning environments that make numerical concepts more accessible and meaningful.

Extensive research has documented elements of ethnomathematics in various cultural artifacts, ranging from traditional architecture and crafts to local games and culinary traditions (Payadnya, Atmaja, et al., 2025). However, a critical review of these studies reveals a tendency to force formal school numeracy into cultural contexts, often overlooking the authentic cognitive and numerical processes of the community (Bautista et al., 2026; Suherman & Vidákovich, 2024a; Vadivel et al., 2026). There remains a significant gap in exploring how *numerical practices* naturally emerge in local traditions without relying on formal numerical formalization. Furthermore, the rich cultural heritage of West Pasaman, specifically the "Maapam" tradition, remains largely unexplored in the literature of ethnomathematics (Chaussée et al., 2022; Gutiérrez et al., 2023; Sitokdana et al., 2026).

The Maapam tradition in West Pasaman, Sumatra, is a communal practice of making and sharing traditional cakes (*apam*) to foster social cohesion, mutual assistance (*gotong royong*), and gratitude (Abreh, 2023; Cahoon et al., 2021; Ramadhani et al., 2023). Beyond its profound socio-cultural values, the execution of this tradition inherently requires complex cognitive activities (Bedewy & Lavicza, 2023; Chrisomalis, 2021; Semba, 2026). The community engages in numerical reasoning for ingredient composition, practical arithmetic and budgeting for purchasing materials, and spatial-numerical measurements during the cooking and molding processes (Utami et al., 2021). These activities represent authentic numerical practices deeply embedded in the cultural fabric of the society, yet they have not been formally analyzed as a context for numeracy education.

Therefore, this study aims to explore the elements of ethnomathematics within the Maapam tradition in West Pasaman, specifically focusing on identifying and analyzing the authentic numerical practices and numeracy embedded in its cultural activities. By reframing these practices from formal numeracy to everyday numerical reasoning, this research seeks to highlight how local wisdom can serve as a meaningful, culturally responsive context for numeracy learning. Ultimately, this work intends to provide a novel perspective on integrating indigenous numerical practices into the curriculum to enhance students' numeracy skills and their appreciation for local cultural heritage.

Method

This study employed a qualitative approach with an ethnographic design. Rooted in anthropological methodology, ethnography is utilized to examine a community and its culture through an in-depth understanding of various aspects of human life, including social interactions, relationships, and cultural practices within their full complexity (Suherman & Vidákovich, 2022). This design was specifically chosen to deeply explore the execution of the Maapam tradition from an ethnomathematical perspective and to identify the authentic numerical practices and numeracy embedded within it. The ethnographic approach enables researchers to comprehend the cultural meanings, activities, and values inherent in the tradition through direct field observation and interviews.

The qualitative orientation of this study allows the researchers to investigate cultural phenomena within their natural setting without manipulating the activities being observed. The Maapam tradition is understood as a living cultural practice in which mathematical ideas are naturally integrated into social and communal activities. Therefore, the researchers sought to observe the tradition as it was performed by community members and to document the processes, interactions, decisions, and numerical activities that occurred throughout its implementation. This approach provides opportunities to capture contextual information that may not be revealed through quantitative measurement alone.

The ethnographic design was particularly relevant because the Maapam tradition involves collective knowledge transmitted through social interaction and cultural experience. Community members possess practical knowledge concerning the preparation of ingredients, measurement, proportion, budgeting, cooking procedures, and distribution of *apam*. Much of this knowledge is tacit and is acquired through observation, participation, repetition, and communication among generations. Ethnographic inquiry enables these forms of knowledge to be documented and interpreted within the cultural context in which they are practiced.

Data collection focused on the various stages of the Maapam tradition, beginning with the preparation and procurement of ingredients and continuing through the preparation of the dough, molding, cooking, and distribution of *apam* (Sari & Dani, 2026). During these activities, attention was given to numerical practices such as counting, measuring, estimating, comparing quantities, determining proportions, calculating costs, and organizing spatial arrangements. The researchers examined how community members used these numerical practices to solve practical problems and make decisions during the tradition. Such observations were important for identifying authentic forms of numeracy that occur naturally in cultural activities.

Direct observation was used to document the actions, tools, materials, and interactions involved in the Maapam tradition. The researchers observed how participants handled ingredients, used traditional equipment, determined quantities, and adjusted procedures based on practical considerations. Field observations also provided information about the physical characteristics of cultural artifacts, such as the *apam* mold, which can be interpreted through geometric and spatial concepts. Detailed field notes were used to record relevant events, numerical activities, explanations, and contextual information observed during the research process (Hidayat & Mustafa, 2024).

Interviews were also conducted with community members who possess knowledge and experience related to the Maapam tradition. The interviews were intended to obtain participants' explanations regarding the meaning of the tradition, the procedures involved, the basis for determining quantities, and the reasoning behind particular practices. Through these conversations, researchers could distinguish between formal mathematical interpretations imposed by researchers and the practical numerical knowledge actually used by community members. The combination of observation and interviews therefore provided complementary perspectives for interpreting the ethnomathematical elements of the tradition (Bukari, 2026; Siswanto et al., 2026).

Data analysis was conducted interpretively by identifying, categorizing, and describing numerical practices that emerged from the field data. The identified practices were then connected with relevant mathematical concepts, including proportional reasoning, numerical scaling, practical arithmetic, budgeting, linear relationships, measurement, geometry, and spatial reasoning. The analysis emphasized the cultural context and meaning of each practice rather than merely translating community activities into formal mathematical procedures. Through this process, the study sought to demonstrate that numeracy is embedded within the Maapam tradition as an authentic form of cultural knowledge. The ethnographic approach ultimately provides a comprehensive understanding of how mathematical thinking operates within everyday cultural practices and how these practices may contribute to the development of meaningful ethnomathematics-based learning contexts.

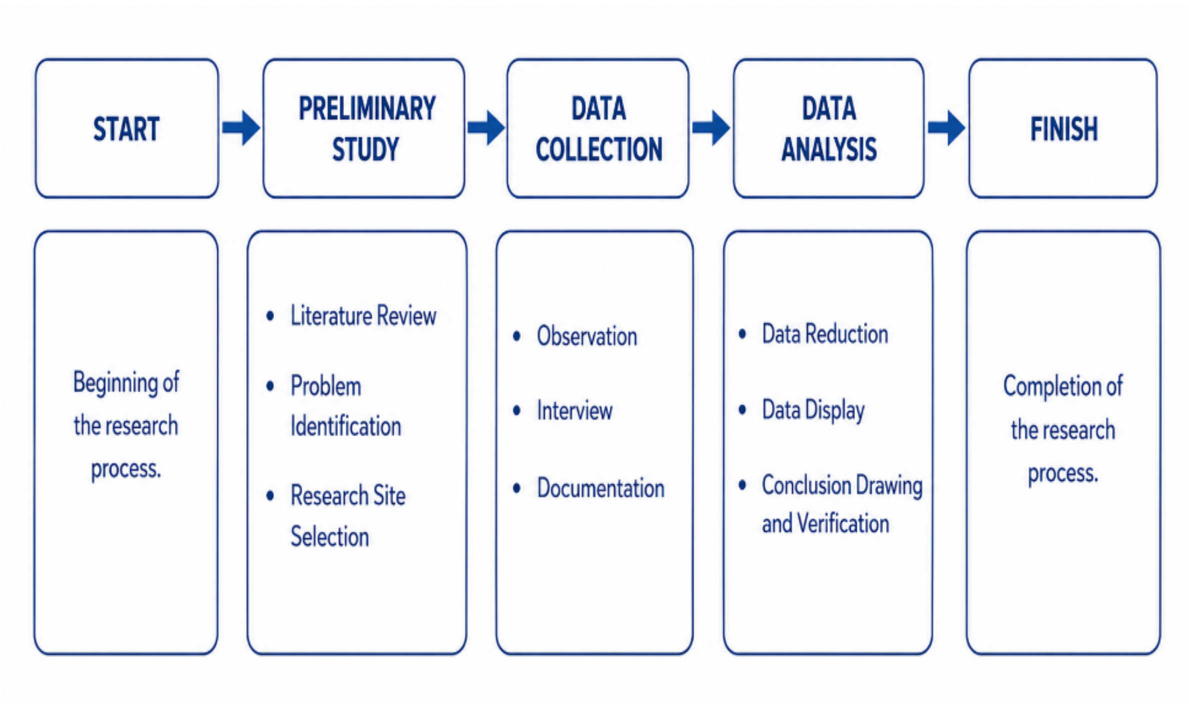

Figure 1. Research flow

Ethnographic research focuses on descriptive data that illustrate the behaviors, activities, and cultural practices of a community group. Therefore, the primary data sources in this study were obtained from informants who are directly and actively involved in the execution of the Maapam tradition. Secondary data were gathered from relevant literature to serve as a theoretical foundation. The data collection techniques employed included observation, in-depth interviews, and documentation. Observations were conducted directly to witness the entire sequence of the Maapam tradition and to identify specific activities involving numerical reasoning and practical numeracy. To uncover the cultural meanings and the underlying numerical practices, in-depth interviews were conducted with community members who possess comprehensive knowledge of and participate in the tradition. Furthermore, the data from observations and interviews were triangulated and strengthened by documentation.

This research was executed in three main stages: preliminary study, data collection, and data analysis. The preliminary study began with a literature review to examine relevant theories, identify problems based on observed phenomena, and determine the research location aligned with the study's objectives. Subsequently, data collection was conducted, followed by data analysis using the interactive model proposed by Miles (1994). This analysis model comprises data condensation (reduction), data display, and conclusion drawing/verification. The final stage involved formulating the conclusions based on the thoroughly analyzed data.

Result and Discussion

The Maapam Tradition as a Context for Authentic Numerical Practices

The Maapam tradition in West Pasaman is a communal practice of making and sharing traditional cakes (*apam*) to foster social cohesion, mutual assistance, and gratitude. The process involves gathering ingredients such as rice flour, coconut milk, and palm sugar, and cooking them using traditional tools. Beyond its socio-cultural values, the execution of this tradition inherently requires complex cognitive activities. The community naturally engages in various numerical practices throughout the process, from determining ingredient composition and budgeting for material procurement to spatial-numerical measurements during the molding process. These activities represent authentic numeracy deeply embedded in the cultural fabric, demonstrating that numerical concepts are applied intuitively in daily cultural practices without relying on formal symbolic procedures.

The preparation of apam involves a series of activities requiring careful planning and coordination. Community members gather and prepare essential ingredients such as rice flour, coconut milk, and palm sugar, while also preparing traditional cooking equipment. The quantity of ingredients must be adjusted according to the amount of apam to be produced and the number of people who will receive it. Consequently, the community makes practical calculations when determining the amount of each ingredient, estimating the required materials, and managing the available resources. These activities demonstrate that mathematical thinking is naturally integrated into the preparation of traditional food.

Numerical practices are also evident in the process of procuring and managing materials. Before the preparation begins, community members may estimate the total cost of ingredients, compare prices, determine the quantity of materials that need to be purchased, and distribute financial responsibilities among participants. Such activities involve basic arithmetic operations, estimation, comparison, and proportional reasoning. Although these calculations are generally performed informally and are not expressed through formal mathematical notation, they reflect the application of mathematical concepts in authentic everyday situations (Siregar, 2026). The community therefore develops and applies practical numeracy skills through participation in the Maapam tradition.

Furthermore, spatial and numerical reasoning can be observed during the molding, portioning, and cooking processes. The dough needs to be divided into appropriate portions so that the resulting apam have relatively consistent sizes and shapes. Community members may estimate the amount of dough required for each piece, determine the number of cakes that can be produced from a particular quantity of dough, and arrange the cakes according to the available cooking space. These practices involve concepts related to measurement, quantity, proportion, spatial organization, and estimation. Such activities illustrate how mathematical reasoning can emerge naturally from culturally situated practices without requiring formal instruction or symbolic mathematical procedures.

Therefore, the Maapam tradition can be understood as an authentic context for exploring numeracy embedded within local culture. The numerical activities involved in determining ingredient composition, estimating costs, measuring portions, organizing space, and distributing the final products demonstrate that numeracy is closely connected to social and cultural practices. This perspective highlights the importance of recognizing local traditions as meaningful sources of mathematical knowledge and learning experiences. Integrating the Maapam tradition into educational contexts can provide students with opportunities to connect formal mathematical concepts with real-life cultural practices, while simultaneously fostering appreciation for local heritage, communal values, and the knowledge possessed by the community.

Proportional Reasoning and Numerical Scaling in Ingredient Composition

The concept of ratio and proportion is reframed as proportional reasoning and numerical scaling in the tradition. The community applies proportional reasoning to determine the exact composition of rice flour, coconut milk, pandan leaf water, and salt to achieve the desired texture and taste. For instance, a standard batch of *apam* dough requires 4 kg of rice flour and coconut milk extracted from 10 coconuts (approximately 2.5 kg). This proportional relationship must be strictly maintained, whether the batch size is scaled up or down, to ensure consistent quality. This demonstrates that the community utilizes numerical scaling in their daily activities.

The community applies proportional reasoning when determining the composition of rice flour, coconut milk, pandan leaf water, and salt. Each ingredient has a specific function in determining the physical and sensory characteristics of the apam. Therefore, changes in the quantity of one ingredient require corresponding adjustments to the quantities of other ingredients. For example, a standard batch of apam dough requires approximately 4 kg of rice flour and coconut milk extracted from 10 coconuts, producing approximately 2.5 kg of coconut milk. The relationship between these quantities becomes a practical reference for maintaining the quality of the dough.

The proportional relationship is particularly important when the community needs to increase or decrease the production of apam. If a larger quantity is required for a communal gathering, the amount of rice flour and coconut milk is increased proportionally. Conversely, when preparing a smaller batch, the quantities of ingredients are reduced while maintaining the same relative relationship. For example, if the amount of rice flour is doubled, the corresponding quantity of coconut milk and other ingredients must also be adjusted appropriately. This process illustrates numerical scaling, in which a known quantity is multiplied or reduced by a particular factor while preserving the underlying proportional relationship.

The practice also involves estimation and decision-making based on accumulated cultural knowledge. Experienced members of the community can determine appropriate quantities of ingredients through visual estimation, previous experience, and sensory judgment. They may recognize whether the dough contains sufficient liquid, whether its consistency is appropriate, or whether additional ingredients are required. Although these judgments are not always expressed using standardized units or mathematical equations, they involve sophisticated numerical reasoning. The ability to maintain consistent proportions through estimation demonstrates that mathematical thinking can be embedded in practical knowledge and cultural experience (Siregar, 2025).

Thus, the preparation of apam provides an authentic example of proportional reasoning and numerical scaling in a culturally meaningful context. The relationship among the quantities of rice flour, coconut milk, pandan leaf water, and salt illustrates how mathematical concepts such as ratio, proportion, multiplication, division, estimation, and scaling are applied naturally in community life. This practice demonstrates the potential of the Maapam tradition as an ethnomathematical context for learning proportional reasoning. By connecting formal mathematical concepts with familiar cultural practices, students can develop a deeper understanding of proportional relationships while simultaneously appreciating the mathematical knowledge embedded within their local cultural heritage.

Contextual Numerical Problem 1: In preparing for the Maapam tradition, the committee decides to make three times the standard dough batch to distribute to more residents. How many kilograms of rice flour and how many coconuts must be prepared? Conversely, if the committee only has 6 kg of rice flour, how many coconuts are needed to maintain the same proportional ratio so that the texture of the *apam* remains unchanged?

The committee decides to prepare three times the standard dough batch. This situation requires the quantities of all major ingredients to be multiplied by the same scaling factor. Therefore, the amount of rice flour required is calculated by multiplying the standard quantity by three. Similarly, the number of coconuts must also be increased threefold so that the proportion between rice flour and coconut milk remains consistent. This illustrates the application of multiplication and proportional reasoning in a culturally meaningful context.

Based on the standard recipe, the quantity of rice flour required for three batches is 3×4 kg, resulting in 12 kg of rice flour. At the same time, the required number of coconuts is 3×10, resulting in 30 coconuts. Thus, the committee needs to prepare 12 kg of rice flour and 30 coconuts to produce three times the standard amount of *apam*. The calculation demonstrates how numerical scaling can be used to adjust food production according to community needs.

The problem can also be considered in the reverse direction. Suppose that the committee has only 6 kg of rice flour available. Since the standard recipe requires 4 kg of rice flour for every 10 coconuts, the available amount of rice flour represents one and a half times the standard quantity. To maintain the same proportional relationship, the number of coconuts must therefore also be multiplied by 1.5. This ensures that the coconut content remains appropriate relative to the amount of rice flour.

Using the proportional relationship, the required number of coconuts can be determined as $(6 \div 4) \times 10 = 15$ coconuts. Therefore, if 6 kg of rice flour is available, the committee needs approximately 15 coconuts to maintain the same ratio as the standard recipe. This calculation illustrates how division and multiplication can be combined to solve a proportional problem and demonstrates that the same mathematical relationship can be used both to increase and decrease the scale of production.

Practical Arithmetic and Budgeting in Material Procurement

The concept of linear equations is reframed as practical arithmetic and budgeting during the procurement of ingredients. The community must calculate the quantity and cost of materials to align with their needs and available budget. This activity involves determining the relationship between two unknown quantities, such as the unit price of rice flour and palm sugar, based on the total cost of combined purchases. This reflects practical numeracy used to solve real-world transactional problems.

The procurement of ingredients requires the community to calculate both quantity and cost. Ingredients such as rice flour, coconut milk, palm sugar, pandan leaves, and salt must be purchased or prepared in accordance with the production requirements. The community considers the quantity of each ingredient and its corresponding price before making purchasing decisions. These calculations allow them to estimate the total expenditure and determine whether the available budget is sufficient to meet their needs.

Budgeting becomes particularly important when Maapam is prepared collectively for a large community event. The quantity of apam produced may vary depending on the number of people participating in or receiving the food. As the production target increases, the quantity of ingredients and the associated expenditure also increase. This creates a relationship between production quantity, material requirements, and total cost. Such relationships can be interpreted mathematically as linear relationships, particularly when the price per unit remains relatively constant.

Practical arithmetic is also evident when the community compares the prices of different ingredients and determines the most appropriate purchasing strategy. For example, they may need to determine how much rice flour and palm sugar can be purchased within a predetermined budget. If the unit prices of the ingredients are known but the quantities are unknown, the community must reason backward from the total amount of money available. This involves addition, multiplication, subtraction, division, estimation, and comparison, all of which are fundamental components of practical numeracy.

In certain situations, the community may encounter two unknown quantities in a purchasing transaction. For instance, when the total expenditure for rice flour and palm sugar is known but the exact quantity or price of one of the materials is uncertain, the relationship between the known and unknown quantities can be used to determine the missing value. Mathematically, such a situation can be represented using a simple linear equation. The community solves the problem through practical reasoning based on prices, quantities, and previous purchasing experience rather than through formal symbolic procedures.

This budgeting practice also demonstrates the connection between mathematical reasoning and resource management. Community members must ensure that the available funds are used efficiently while still obtaining sufficient quantities and maintaining the quality of the ingredients. Decisions about purchasing materials therefore require not only numerical calculations but also estimation, prediction, comparison, and prioritization. These practices show that mathematical thinking is embedded in economic and social activities associated with the Maapam tradition.

Therefore, the procurement and budgeting processes in the Maapam tradition provide an authentic cultural context for understanding the underlying ideas of linear equations. The relationships between quantity, unit price, total cost, production needs, and available budget reflect mathematical structures that can be modeled using linear equations. Recognizing these practices as forms of practical numeracy demonstrates that mathematical knowledge exists within everyday cultural activities and does not always depend on formal symbolic representation. The Maapam tradition can consequently serve as a meaningful ethnomathematical context for connecting classroom concepts of linear equations with real-world transactional problems, financial decision-making, and local cultural knowledge.

Contextual Numerical Problem 2: The committee purchases the main ingredients for the *apam*. To arrange the budget, they need to know the unit price of each material. Based on the purchase records, 6 kg of rice flour and 1 kg of palm sugar cost a total of Rp174,000, while 4 kg of rice flour and 2 kg of palm sugar cost a total of Rp156,000. What is the unit price of 1 kg of rice flour and 1 kg of palm sugar?

Based on the purchase records, the committee finds that 6 kg of rice flour and 1 kg of palm sugar cost a total of Rp174,000. In another transaction, 4 kg of rice flour and 2 kg of palm sugar cost Rp156,000. The unit prices of both ingredients are initially unknown. Therefore, the committee must use the available information about the quantities and total costs to determine the price of 1 kg of rice flour and 1 kg of palm sugar.

This situation can be represented mathematically using a system of two linear equations with two variables. Let the price of 1 kg of rice flour be represented by (x), and the price of 1 kg of palm sugar be represented by (y). The first purchase can then be represented by the equation ($6x + y = 174{,}000$), while the second purchase can be represented by ($4x + 2y = 156{,}000$). These equations express the relationship between the quantities purchased, their unit prices, and the total cost.

To determine the unknown prices, the committee can use elimination or substitution. Multiplying the first equation by 2 gives ($12x + 2y = 348{,}000$). Subtracting the second equation, ($4x + 2y = 156{,}000$), from this equation results in ($8x = 192{,}000$). Therefore, the value of (x), representing the price of 1 kg of rice flour, is Rp24,000. Substituting this value into the first equation gives ($6(24{,}000) + y = 174{,}000$), so ($y = 30{,}000$).

Thus, the unit price of rice flour is Rp24,000 per kg, while the unit price of palm sugar is Rp30,000 per kg. These values allow the committee to estimate the total cost of future purchases more accurately. For example, if the quantity of either ingredient changes according to the amount of *apam* that must be produced, the committee can calculate the expected expenditure using the established unit prices. This demonstrates how algebraic reasoning can support practical financial planning in a cultural activity.

This contextual problem illustrates that the mathematical concept of a system of linear equations can be naturally connected to budgeting and purchasing practices in the Maapam tradition. The community's need to determine unit prices from purchase records reflects practical numeracy involving quantities, costs, unknown values, and financial decision-making. In an ethnomathematical learning context, this situation can help students understand how systems of linear equations are applied to authentic transactional problems (Sari et al., 2023). It also demonstrates that mathematical reasoning is not limited to formal classroom procedures but is embedded in everyday economic activities associated with local cultural traditions.

Spatial-Numerical Measurement in the Apam Mold

The concept of geometry is reframed as spatial-numerical measurement and spatial reasoning observed in the physical artifacts used in the tradition. The top part of the *apam* mold is circular. This artifact serves as a contextual object for exploring spatial reasoning and numerical measurement, such as understanding the relationship between the radius and diameter, as well as estimating the circumference and area. The circular shape of the mold allows individuals to apply numerical concepts related to spatial dimensions in a concrete, everyday context.

One of the most significant geometric artifacts in the Maapam tradition is the *apam* mold. The upper part of the mold has a circular shape that provides a concrete representation of geometric forms in everyday cultural practice. The circular structure is not merely an aesthetic feature but also determines the shape and size of the *apam* produced. Consequently, the mold can serve as a contextual object for exploring fundamental concepts of circles, including diameter, radius, circumference, and area.

The circular shape of the mold allows individuals to recognize the relationship between the radius and diameter. The diameter represents the distance across the circle through its center, while the radius represents the distance from the center to the edge. In practical activities, these dimensions can be observed and measured directly using simple measuring instruments. The relationship that the diameter is twice the length of the radius provides an opportunity to connect physical measurement with formal mathematical concepts (Habsyi et al., 2025).

The mold can also be used to explore the concept of circumference. By measuring the distance around the circular edge of the mold, individuals can estimate its circumference and compare the result with the diameter. This activity provides an opportunity to recognize the mathematical relationship expressed through the constant π. The circumference can be estimated using the relationship between π and the diameter, allowing students to connect an observable physical object with an abstract mathematical concept.

In addition to circumference, the circular mold provides a contextual opportunity for understanding the concept of area. The surface area enclosed by the circular mold determines the approximate spatial region occupied by each portion of *apam*. By measuring or estimating the radius, individuals can calculate the area of the circular surface using the mathematical relationship between π and the square of the radius. This demonstrates how geometric calculations can be applied to understand the physical characteristics of objects encountered in everyday cultural activities (Griswold et al., 2013).

The use of the *apam* mold also involves spatial reasoning and estimation. Community members must recognize the available space within the mold, determine an appropriate amount of dough, and consider how the dough will occupy the circular surface during cooking. These decisions involve an intuitive understanding of size, proportion, position, and spatial capacity. Through repeated practice, community members develop practical spatial knowledge that enables them to use the mold efficiently and produce *apam* with relatively consistent dimensions.

Therefore, the circular *apam* mold represents an important ethnomathematical artifact through which geometric concepts can be connected to local cultural practices. Its physical characteristics provide opportunities to explore radius, diameter, circumference, area, measurement, estimation, and spatial reasoning in a concrete and meaningful context. Integrating this artifact into mathematics learning can help students move from familiar cultural experiences toward formal geometric representations. In this way, the Maapam tradition demonstrates that geometry is not limited to abstract figures presented in textbooks but is also embedded in physical objects, practical activities, and cultural knowledge within everyday community life.

Contextual Numerical Problem 3: In the Maapam tradition, the locals cook the *apam* dough using a mold with a circular top part that has a diameter of 16 cm. Determine the radius of the top part of the mold. Calculate the circumference and the area of the top part of the mold.

The findings of this study highlight a profound reality: complex numerical reasoning and spatial awareness are not exclusive domains of formal education, but are organically embedded in communal cultural practices (Annajmi et al., 2026; Barwell et al., 2022; Payadnya, Putri, et al., 2025). The Maapam tradition demonstrates that the community of West Pasaman intuitively employs sophisticated cognitive strategies to solve real-world problems, manage resources, and maintain social cohesion. This is highly significant because it challenges the conventional view that numeracy is merely an academic construct, repositioning it instead as a lived, cultural competence. By revealing how authentic numerical practices function seamlessly within a socio-cultural ritual, this study shifts the paradigm of how we understand human cognition in everyday life (Búrigo, 2025; Gbormittah et al., 2025; Sebsibe et al., 2023).

From an educational perspective, the integration of these authentic numerical practices into the curriculum holds transformative potential. Rather than relying on abstract, decontextualized exercises, educators can utilize the Maapam tradition to teach proportional reasoning, practical budgeting, and spatial measurement (Magnate, 2025; Suherman & Vidákovich, 2024b; Thanheiser, 2023). This culturally sustaining approach bridges the persistent disconnect between school numeracy and students' daily lives. When learners engage with numerical concepts through the lens of their own cultural heritage, the learning process becomes inherently meaningful, accessible, and responsive to their lived experiences. It transforms numeracy from a set of rigid rules into a dynamic tool for understanding and interacting with the world (Lachney et al., 2025; Mocorro & Mocorro, 2025; Semba, 2026).

Furthermore, this study underscores the critical role of ethnomathematics in cultural preservation and identity formation. By formally recognizing and documenting the numerical practices within the Maapam tradition, this research validates the intellectual heritage of the local community. It reveals that indigenous knowledge systems are highly sophisticated and deeply analytical. Integrating such local wisdom into education not only enhances students' numerical competence but also fosters a deep sense of cultural pride. In an era where globalization often marginalizes local traditions, leveraging cultural practices as educational resources ensures that indigenous knowledge is preserved, respected, and passed on to future generations.

Ultimately, this work contributes to the broader field of ethnomathematics by expanding its scope beyond physical artifacts and architecture, highlighting culinary and communal traditions as rich sites for numerical cognition. The Maapam tradition serves as a powerful testament to the universality of numerical reasoning, proving that human societies naturally develop robust numerical strategies to sustain both their physical needs and their cultural continuity.

Conclusion

This study concludes that the Maapam tradition in West Pasaman embodies rich, authentic numerical practices that naturally emerge within the community's cultural activities. Through the lens of ethnomathematics, the research identified proportional reasoning and numerical scaling in ingredient composition, practical arithmetic and budgeting in material procurement, and spatial-numerical measurement in the use of circular molding tools. These findings demonstrate that numeracy is not merely an academic construct but a lived cultural competence deeply embedded in communal traditions. The Maapam tradition therefore holds significant potential as a culturally responsive context for numeracy education, offering students meaningful opportunities to develop numerical reasoning through contexts closely connected to their daily lives. Beyond enhancing numerical competence, integrating this local wisdom into the curriculum fosters cultural appreciation and strengthens character values such as mutual assistance, cooperation, and responsibility. This study contributes to the broader field of ethnomathematics by documenting previously unexplored numerical practices within the Maapam tradition, providing a valuable reference for developing culturally sustaining and contextually grounded numeracy learning.

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