



# Ethnomathematics in Culinary Practices: Getuk Pisang as Mathematical Learning Medium for Early Childhood

Shelline Eviani Shirly <sup>a✉</sup>, Suharti Suharti <sup>b</sup>, Kartika Rinakit Adhe <sup>c</sup>

<sup>a b c</sup> Pendidikan Guru Pendidikan Anak Usia Dini, Universitas Negeri Surabaya, Indonesia

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## Abstract

This qualitative ethnographic study explores ethnomathematics within the local culinary tradition of Getuk Pisang as a learning medium for children aged 4–7 in Kediri. The study involves five participants: two children aged 4, two aged 5, and one aged 7. All participants, except the 7-year-old child who assists their parents in selling, are enrolled in early childhood education (PAUD). The research is motivated by the limited integration between formal mathematics and children’s concrete cultural experiences. Data were collected through observations and interviews with parents and analyzed using the interactive model of Miles et al. The findings identify mathematical concepts embedded in Getuk Pisang, including geometry, non-standard measurement, number sense, and seriation. Children demonstrate an intuitive understanding of these concepts through contextual interaction. The study suggests that local culinary traditions can serve as effective learning media to reduce mathematics anxiety and enhance cognitive engagement.

**Keywords:** *early childhood, ethnomathematics, getuk pisang, local wisdom, mathematics learning*

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✉ Corresponding author :

E-mail address: [shelline.21023@mhs.unesa.ac.id](mailto:shelline.21023@mhs.unesa.ac.id) (Surabaya, Indonesia)

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## Introduction

Early Childhood Education constitutes a crucial foundation within the formal education system, as children at this stage are in what is commonly referred to as the “golden age.” During this period, cognitive development accelerates significantly, particularly in the development of logical and mathematical thinking skills (Nopiana & Misgiyati, 2025). However, classroom realities often reveal that mathematics is perceived as a rigid subject, disconnected from children’s lived experiences. This gap between formal mathematical concepts and children’s empirical experiences contributes to low interest and limited foundational understanding of numeracy and geometry from an early age.

The importance of meaningful mathematics learning aligns with Jean Piaget’s theory of cognitive development, which posits that children in the preoperational and early concrete operational stages construct knowledge through direct interaction with physical objects (Bujuri, 2018). Therefore, mathematics should be presented as something “close” and “tangible.” One approach that has gained increasing attention in global educational discourse is ethnomathematics. Introduced by Ubiratan D’Ambrosio, ethnomathematics bridges culture and mathematics by emphasizing that mathematics is not merely a product of Western thought, but a cultural practice embedded in every society, including in how people measure, count, and design cultural artifacts or culinary products (Damayanti & Irfah, 2025).

In the Indonesian context, which is rich in local wisdom, ethnomathematics offers broad opportunities for innovation in ECE curricula. Unfortunately, the integration of local cultural elements into early childhood mathematics learning is often overlooked. In fact, the integration of local culture in learning, commonly referred to as culturally responsive pedagogy, has been shown to enhance children’s emotional and cognitive engagement with learning materials (Widayati & Maha, 2025). Through this approach, children not only learn mathematical skills but also develop an appreciation for their cultural identity.

One local cultural product with significant potential as a medium for mathematics learning is *Getuk Pisang*, a traditional culinary specialty from Kediri. Visually, *Getuk Pisang* has distinctive physical characteristics: it is cylindrical (elongated) in shape and wrapped in banana leaves using specific folding techniques. Its production process involves various activities rich in mathematical concepts, including weighing ingredients (measurement), cutting (partitioning and geometry), and packaging (estimation and patterning). The use of *Getuk Pisang* as a learning medium is concrete and sensorially engaging through its texture, aroma, color, and tangible form which allows children to directly manipulate, compare, and observe objects, thereby facilitating the development of basic mathematical concepts such as shape recognition, measurement, and classification. It is also highly relevant to children's daily lives, particularly in East Java.

Previous studies have demonstrated that ethnomathematics is effective in enhancing mathematical conceptual understanding. Several studies over the past five years indicate that integrating local culture into mathematics learning improves student engagement and conceptual comprehension. For instance, [Jasmani et al. \(2024\)](#) found that the use of traditional foods significantly improves early childhood mathematical literacy, while [Ndeot et al. \(2025\)](#) reported that culture-based games enhance children's problem-solving skills and cognitive engagement. Similarly, [\(Reza et al., 2024\)](#) showed that traditional games such as *congklak* contain various mathematical concepts, including number operations and geometry. [\(Rahmawati et al., 2022\)](#) further emphasized that culture-based educational play tools can strengthen conceptual understanding while instilling cultural values in young children. Additionally, [Ismail et al. \(2023\)](#) noted that ethnomathematics research in Indonesia is still dominated by ethnographic studies focusing primarily on geometry, with limited attention to early childhood education and contextual approaches. Nevertheless, the use of local culinary products as a medium for mathematics learning in early childhood remains underexplored, creating a research gap for investigating mathematical concepts such as classification, one-to-one correspondence, geometric shapes, and measurement through *Getuk Pisang*.

Despite the growing body of evidence supporting the effectiveness of ethnomathematics in enhancing mathematical understanding, several critical gaps remain. First, existing studies predominantly focus on general cultural artifacts such as traditional games, with limited attention to local culinary products as learning media. Second, prior research tends to emphasize specific domains particularly geometry rather than providing an integrated exploration of multiple foundational mathematical concepts, such as classification, one-to-one correspondence, measurement, and numeracy, within a single contextual medium. Third, although ethnomathematics has been widely studied, its application in early childhood education, especially for children aged 4–7 years, remains insufficiently explored within authentic, everyday learning contexts.

This gap underpins the significance of the present study. The study aims to explore how mathematical concepts such as classification, one to one correspondence, geometric shape recognition, and measurement are manifested through the use of *Getuk Pisang* as a learning medium. Children aged 4–7 years are at a critical transitional stage in which they begin to understand relationships among objects ([Siregar, 2025](#)). By engaging with *Getuk Pisang*, children are encouraged to directly observe cylindrical shapes, compare lengths of packaging, and count the number of pieces in an enjoyable and meaningful manner.

Theoretically, this study is grounded in Vygotsky's social constructivist perspective, which emphasizes that learning occurs through social interaction within a cultural context ([Jeong et al., 2022](#)). *Getuk Pisang* is not merely food, but a sociocultural object that serves as a bridge for children to reach their Zone of Proximal Development (ZPD) in mathematical cognition ([Mustakimah, 2023](#)). Moreover, the use of such concrete media supports the implementation of the Merdeka Curriculum, which emphasizes project-based learning and the integration of local wisdom.

Through the exploration of ethnomathematics in *Getuk Pisang*, it is expected that early childhood educators will gain new perspectives, recognizing that mathematics learning resources do not have to be expensive or difficult to obtain. Local wisdom embedded in everyday settings, such as dining tables or traditional markets, can function as *sophisticated mathematical laboratories*, in the sense that they provide rich, authentic, and contextually meaningful environments where multiple mathematical concepts naturally emerge through real life activities. These settings enable children to engage simultaneously in observation, manipulation, reasoning, and problem solving without relying on formal or artificial instructional tools.

For example, at a dining table, children can count pieces of *Getuk Pisang* to practice one to one correspondence, divide portions among peers to understand fairness and basic division, or compare sizes to develop measurement and estimation skills. In traditional market contexts, children may classify items based on type or size, recognize geometric shapes in food packaging, or estimate quantities during buying and selling interactions. Such activities demonstrate that everyday environments can facilitate integrated mathematical learning experiences that are both meaningful and developmentally appropriate.

This article aims to provide an in-depth description of how ethnomathematical exploration occurs through *Getuk Pisang* and to identify the mathematical concepts recognized by children aged 4–7 during their interaction with this medium.

The urgency of this study also lies in efforts to revitalize local culture amid the growing influence of modern culinary trends, which often distance children from their cultural heritage. By positioning *Getuk Pisang* as a central learning medium, educational institutions contribute to the preservation of cultural heritage from an early age. Thus, mathematics is no longer perceived as intimidating, but rather as an enjoyable cultural exploration. The analysis presented in this article is expected to make a significant contribution to the development of ethnomathematics-based teaching modules in early childhood education, particularly in enriching the literature on culturally based education in Indonesia.

## Methodology

This study employed a qualitative research design using an educational ethnography approach. This method was selected based on the nature of the study, which aims to describe, analyze, and interpret patterns of behavior, beliefs, and language within a particular community in this case, the interaction of early childhood learners with local cultural artifacts (Mahendra et al., 2024). Educational ethnography enables researchers to enter the social reality of participants in a naturalistic setting to uncover how mathematical concepts are implicitly embedded in the practices of producing and consuming *Getuk Pisang*. This approach does not solely focus on cognitive aspects but also considers the sociocultural dimensions surrounding children's learning processes. The researcher acted as the primary instrument, conducting participant observation to capture the meanings behind ongoing ethnomathematical activities.

The participants in this study were children aged 4 to 7 years residing in Kediri, East Java. The selection of Kediri as the research site was strategic and purposive, considering that the area is a central hub for the traditional production of *Getuk Pisang*. Children in this region are assumed to have sociocultural familiarity with this medium, either through family environments or observations in traditional markets. A total of five children and three parents were involved as primary participants, selected based on their cognitive developmental stage, transitioning from the preoperational to the early concrete operational stage. In addition to the children, parents were included as supporting informants to provide deeper contextual insights into cultural values and technical processes underlying the mathematical exploration.

To obtain comprehensive and in-depth data, this study applied data triangulation through three primary techniques; Participant Observation: The researcher conducted direct observations of children's activities while interacting with *Getuk Pisang* as a learning medium. The observation focused on how children identified geometric shapes in the packaging, compared sizes (length and shortness), and engaged in enumeration or counting during the processes of cutting and distributing the food. Field notes were used to record spontaneous behaviors and children's verbal expressions related to mathematical concepts. Semi-Structured Interviews: Interviews were conducted with children using communicative language appropriate to their developmental stage (Piagetian clinical interview approach). The questions were designed to explore children's understanding of quantity, classification, and spatial concepts. Additionally, interviews with parents were conducted to validate children's daily experiences in recognizing objects in their environment. Documentation: This technique was used to collect data in the form of photographs of children's activities, video recordings of the exploration process, and children's work related to *Getuk Pisang*. Documentation served as authentic evidence to strengthen findings obtained from observations.

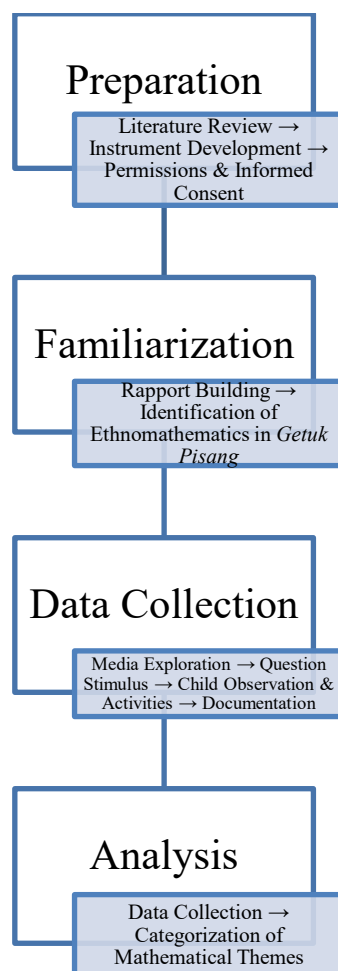
To ensure completeness of the data collection process, all techniques were conducted iteratively and complementarily. Observations, interviews, and documentation were carried out simultaneously to capture both verbal and non-verbal expressions of children's mathematical thinking. The researcher maintained prolonged engagement in the field to enhance the depth of data and to minimize potential bias. In addition, detailed field notes were systematically organized immediately after each session to preserve contextual accuracy. This comprehensive approach ensured that the data collected were rich, contextualized, and reflective of authentic learning interactions within the children's natural environment.

The research procedure was carried out systematically in four main stages; Preparation Stage: This stage included a literature review on ethnomathematics and the characteristics of *Getuk Pisang*, the development of observation instruments and interview guidelines, and obtaining permission from relevant parties as well as informed consent from participants' parents. Familiarization Stage: The researcher conducted initial engagement with participants to build rapport and ensure children felt comfortable. At this stage, the researcher also began identifying ethnomathematical aspects within the *Getuk Pisang* production process in local industry centers. Data Collection Stage: The researcher introduced *Getuk Pisang* into the children's environment. The

exploration was facilitated through guiding questions as stimuli. Children were asked to observe the banana leaf packaging, open it, and cut the contents. All interactions were carefully recorded and documented in detail. Reflection and Analysis Stage: The researcher compiled all field notes, interview transcripts, and visual documentation, which were then categorized based on emerging mathematical concept themes (e.g., geometry, measurement, and number).

The data analysis in this study followed the interactive model proposed by (Matthew B. Miles, A. Michael Huberman, 2014) consisting of data condensation, data display, and conclusion drawing/verification. In the data condensation phase, raw data from field notes, interview transcripts, and documentation were selected, simplified, and coded based on emerging ethnomathematical themes. Subsequently, the data were organized into visual displays, such as matrices and thematic tables, to facilitate pattern identification and interpretation. In the final stage, conclusions were drawn and continuously verified through iterative comparison between data sources to ensure consistency and validity. This analytical process was conducted cyclically throughout the research to maintain coherence between data collection and interpretation.

The research design diagram illustrates a cyclical process consisting of four interconnected stages: preparation, familiarization, data collection, and reflection and analysis. Each stage is linked by continuous feedback loops, indicating that data collection and analysis occurred simultaneously in an iterative manner, consistent with qualitative ethnographic research principles. The stages of the research procedure are illustrated in the following diagram:



**Figure 1. Research Procedure Stages**

Data analysis followed the interactive model proposed by Miles, Huberman, and Saldaña (Matthew B. Miles, A. Michael Huberman, 2014) which consists of: Data Condensation: The process of selecting, simplifying, and transforming raw data from field notes and transcripts into meaningful units of information related to ethnomathematics. Data Display: Organizing the condensed data into descriptive narratives, matrix tables, or diagrams to identify patterns and relationships between cultural activities and mathematical concepts. Conclusion Drawing and Verification: Formulating final findings regarding the exploration of mathematical

concepts through *Getuk Pisang* and rechecking the original data to ensure the consistency and validity of the findings.

To ensure the trustworthiness of the data, several validation strategies were employed. Source triangulation was conducted by comparing information obtained from children, parents, and observational records to identify consistency across perspectives. Methodological triangulation was also applied through the integration of participant observation, semi-structured interviews, and documentation. In addition, member checking was carried out by confirming selected interpretations with parents to validate the accuracy of the findings related to children's experiences. Prolonged engagement and persistent observation were further implemented to enhance data credibility and reduce potential researcher bias. These strategies collectively ensured the rigor and validity of the qualitative analysis.

The stages of data analysis and trustworthiness are presented in the following diagram:

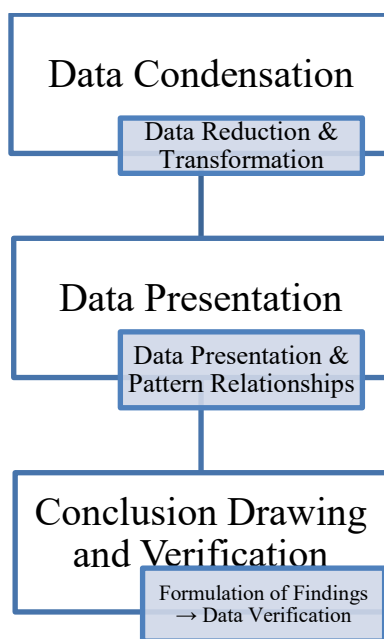


Figure 2. Data Analysis and Trustworthiness Stages

## Results and Discussion

The findings of this study describe field-based evidence on the exploration of mathematical concepts through *Getuk Pisang* as a learning medium among children aged 4–7 years in Kediri. The data are presented based on the categorization of mathematical concepts that emerged during children's interactions with this local culinary artifact, including aspects of geometry, measurement (estimation), number, and classification.

### Identification of Mathematical Concepts in the Morphology of *Getuk Pisang*

Based on observations of the physical characteristics of *Getuk Pisang*, it was found that children were intuitively able to identify its geometric properties. The elongated shape of *Getuk Pisang*, wrapped in banana leaves resembling a cylinder, served as a visual stimulus for introducing three-dimensional geometric forms.

To strengthen the analytical depth of the study, each mathematical concept presented in the table should be elaborated through a more comprehensive narrative that goes beyond descriptive listings. The discussion should integrate observational evidence with interpretive analysis, explaining how specific activities reflect children's cognitive processes and the emergence of mathematical understanding. For instance, in the categories of number, measurement, seriation, and classification, the narrative can clarify not only what children do, but also how these actions indicate developmental progress, strategy use, and conceptual awareness within authentic cultural contexts.

Shape: The observations indicate that children engage with the cross-sectional form of *getuk pisang* slices, which predominantly resemble circular shapes. This activity reflects an emergent understanding of two-dimensional geometry, particularly in recognizing and interpreting basic forms. Beyond simple identification, some children demonstrate early geometric reasoning by associating these shapes with familiar objects or prior knowledge. Variations in how children describe or manipulate the slices suggest differing levels of spatial

awareness and conceptual development, indicating that such culturally grounded materials can effectively support the construction of geometric understanding.

**Table 1. Identification of Mathematical Concepts in Getuk Pisang**

Component of Getuk Pisang	Empirical Findings	
	Observed Children's Activities	Emergent Mathematical Concepts
Shape	Children observe the cross-sectional form of getuk pisang slices	Geometric understanding of two dimensional shapes, particularly circular forms
Number	Children count the number of sticks and getuk pieces using one to one correspondence strategies	Development of numerical cognition, including quantity recognition and one to one correspondence
Measurement	Children compare different pieces of getuk pisang	Foundational measurement concepts, including size differentiation (smaller vs. larger)
Seriation	Children arrange getuk pisang pieces in a sequential order	Understanding of ordering and seriation from smallest to largest
Classification	Children group getuk pisang based on observable characteristics	Classification skills based on specific attributes (ex: color of leaves or size)

**Number:** Children's activities in counting sticks and pieces of *getuk pisang* illustrate the development of foundational numerical cognition. The use of one-to-one correspondence strategies shows that children are not merely reciting numbers but are beginning to understand the relationship between numbers and quantities. This reflects an important stage in early numeracy, where children coordinate verbal counting with physical objects. Additionally, some children display emerging accuracy and consistency in counting, suggesting progressive internalization of counting principles.

**Measurement:** When comparing different pieces of *getuk pisang*, children demonstrate an emerging understanding of measurement concepts, particularly size differentiation. Their ability to distinguish between "smaller" and "larger" pieces indicates the development of comparative reasoning rather than formal measurement. These informal comparisons serve as a foundational step toward more complex measurement skills, as children begin to recognize attributes such as length, volume, or mass through direct sensory experience.

**Seriation:** The activity of arranging *getuk pisang* pieces in sequential order reflects children's developing understanding of seriation. By organizing items from smallest to largest (or vice versa), children practice logical ordering based on a specific attribute. This process requires not only perceptual discrimination but also the ability to apply consistent criteria, demonstrating early forms of logical thinking and pattern recognition that are essential for later mathematical reasoning.

**Classification:** Grouping *getuk pisang* based on observable characteristics, such as size or color of leaves, indicates the development of classification skills. Children show the ability to identify similarities and differences, which is fundamental to categorization. This activity reveals their capacity to form sets based on shared attributes and to justify their grouping decisions. Such skills are critical in building logical structures that underpin more advanced mathematical concepts, including set theory and data organization.

In particular, the exploration of geometric concepts requires a more in depth analysis grounded in the observational data. Rather than merely stating that children recognize circular forms, the discussion should examine how children interact with the cross sectional shapes of *getuk pisang*, how they describe or interpret these forms, and whether they relate them to prior knowledge of two dimensional shapes. Additionally, variations in children's responses such as differences in perception, verbalization, or manipulation should be analyzed to reveal levels of geometric reasoning. This expanded interpretation will provide a more nuanced understanding of how ethnomathematical experiences facilitate early geometric thinking.

### Exploration of Geometry and Spatial Concepts

During the initial observation stage, participant P1 described the shape of *Getuk Pisang* as similar to a bottle, while participant P5 compared it to a pipe. This indicates children's ability to associate concrete objects with familiar shapes. Older children (aged 6–7 years) were able to identify the circular surface at the cut ends of the *Getuk Pisang*, indicating an emerging understanding of circular shapes.

Interview data further revealed that children could distinguish spatial positions through this medium. During the process of unwrapping, children used spatial terms such as “top,” “bottom,” “inside,” and “outside.” Participant P2 stated that “the getuk is inside the banana leaf wrapper,” demonstrating an understanding of containment. Additionally, children demonstrated awareness of left–right and top–bottom orientations through the bamboo skewers used to secure the wrapping. Participant P3 noted that “the skewer is at the right and left ends” when shown horizontally, while participant P4 stated that “the skewer is at the top and bottom ends” when shown vertically. This understanding was reinforced by P2’s parent, who explained, “there is something inside; the outside is the banana leaf, and the inside contains the getuk.”

### Exploration of Measurement and Estimation

Observational and documentation data revealed intensive interaction when children were asked to compare multiple pieces of *Getuk Pisang*. The pieces were cut into various sizes by the children. Participant P1 stated, “This one is big and this one is small,” indicating an awareness of size differences. The participants consistently demonstrated the ability to perform seriation, arranging pieces from the shortest to the longest.

In non-standard measurement activities, children used their fingers as informal measurement tools by holding and comparing the thickness of the pieces. Participants P4 and P5 stated, “This one is bigger because it feels heavier, and this one is the smallest.” Their parents reinforced this observation by guiding them, saying, “Look, the bigger piece is thicker, and the thinnest one is the smallest.” These findings indicate that children engaged in self-initiated measurement using non-standard units.

Additionally, the concept of weight emerged when children compared pieces by holding them in both hands. Participant P2 stated, “This is very heavy,” when asked to lift a piece of *Getuk Pisang*. Through this activity, children were able to estimate that larger pieces have greater mass than smaller ones.



Picture 1. Children Attempting to Lift Getuk Pisang

### Exploration of Number Concepts and Basic Operations

Number concepts emerged significantly when children engaged in cutting *Getuk Pisang* using plastic knives. Field notes indicate that children tended to count the number of pieces produced. One to One, Correspondence: Participant P3 distributed one piece of *Getuk Pisang* to the researcher when asked to give a piece, demonstrating a basic understanding of one-to-one correspondence (one piece for one person). Counting: Children counted the number of pieces they had cut. Participant P4 counted up to eight, P5 up to ten, P3 up to five, P1 up to five, and P2 up to seven. On average, children aged 5–7 years were able to count from 1 to 10 using the *Getuk Pisang* pieces.



Picture 2. Children Counting Pieces of Getuk Pisang

### Exploration of Classification and Patterns

Based on photographic documentation, children were observed grouping *Getuk Pisang* according to specific physical characteristics. Two dominant classification categories emerged: Size-Based Classification: Children grouped smaller and larger pieces separately, as demonstrated by participant P4. Arranging *Getuk Pisang* pieces in a sequence also led to the emergence of patterning. Some children unintentionally created patterns such as “Big – Small – Big – Small” when arranging pieces on a plate. The parent of participant P4 encouraged this activity by saying, “Try arranging them one by one; it’s okay to hold them.” This indicates that local culinary media can stimulate children’s ability to recognize and create repeating patterns.



Picture 3. Children Arranging Getuk Pisang Pieces by Size

### Discussion

#### Ethnomathematics in *Getuk Pisang* as a Cognitive Bridge

The findings indicate that *Getuk Pisang* is not merely a local culinary entity, but a cultural artifact rich in embedded or “frozen” mathematical concepts (Bujuri, 2018). This is consistent with the view that ethnomathematics represents “mathematics in the cultural values of a place”, where mathematical ideas are embedded in everyday practices and artifacts (Kusuma et al., 2024). The activities of children aged 4–7 years in Kediri, particularly in observing the cylindrical shape of *Getuk Pisang* packaging, support D’Ambrosio’s theory that mathematics emerges from cultural practices such as grouping, counting, and measuring. In line with this, ethnomathematics is understood as a field that examines “practices, knowledge, and cultural aspects of mathematics in various societies”, reinforcing the cultural grounding of mathematical activity (Felix Indra Setiaputra, Sri Subanti, Budi Usodo, Triyanto & Hendriyanto, 2022). The children in this study naturally

engaged in mathematization processes without perceiving them as formal mathematical learning. This aligns with (Ndeot et al., 2025) who argue that ethnomathematics enables learners to connect curricular content with their cultural experiences, thereby enhancing motivation and conceptual understanding.

At the age of 4–7 years, the transition from intuitive to logical thinking is strongly influenced by the presence of concrete objects. *Getuk Pisang*, with its distinctive geometric form, provides visual and tactile stimulation that cannot be achieved through paper-based worksheets. This supports the argument that learning mathematics should begin “with the real sociocultural context and the reality around students, rather than relying solely on abstract representations (Vidiantika & Malasari, 2026). When children describe the object as “like a bottle” or “a pipe,” they are engaging in early geometric abstraction. This finding supports the notion of explaining and designing as universal mathematical activities (Weldeana, Hailu Nigus; Leung, 2025). The participants “explain” object forms using familiar language and “design” spatial understanding through interaction with banana leaf packaging.

Based on qualitative data analysis following the framework of Miles, Huberman, and Saldaña (2014), a consistent pattern emerges between cultural activities and universal mathematical practices. Observational data show that children independently performed classification based on the physical dimensions of *Getuk Pisang*. Data condensation further reveals that this traditional packaging functions as a natural mathematical manipulative, effectively introducing fundamental geometric concepts to young children in Kediri.

In conclusion, *Getuk Pisang* serves as a cognitive bridge that reduces the abstraction of formal mathematics. The integration of local wisdom into early childhood education not only preserves cultural heritage but also creates a meaningful learning ecosystem. By utilizing familiar artifacts from their environment, children not only develop mathematical competence but also cultivate a sense of cultural identity and pride (Arip Arizal Mustahidin et al., 2025).

### Deconstructing Geometry through Local Manipulative Media

One of the most prominent findings is children’s ability to recognize plane shapes through slices of *Getuk Pisang*. The study found that children aged 6–7 years began to identify circular shapes in the cross-sections of *Getuk Pisang* after it was cut. This represents a significant cognitive achievement in understanding geometric concepts, particularly in linking two-dimensional representations with real-world objects (Rifqi Andrianto et al., 2024). This understanding also strengthens children’s ability to identify, compare, and apply the concept of circles in various everyday contexts (Turmuzi et al., 2022).

By dissecting *Getuk Pisang*, children implicitly engage with topological concepts and geometric properties. The tactile interaction with the dense texture of the food wrapped in banana leaves enables them to explore boundaries and interior spaces. From a cognitive perspective, this understanding goes beyond visual recognition, as children begin to construct relationships between the diameter of slices and the overall volume (Handayani et al., 2025). This finding demonstrates that local cultural artifacts function as effective cognitive bridges, facilitating the transition from concrete to semi-abstract thinking, as emphasized in progressive mathematization theory.

Methodologically, the use of *Getuk Pisang* as an organic manipulative medium surpasses manufactured teaching aids due to its higher affordance value and strong ecological context. Referring to the analytical framework of (Matthew B. Miles, A. Michael Huberman, 2014) observational data indicate that learning becomes more meaningful when the objects used are culturally and emotionally relevant to children’s daily lives. This integration of local wisdom creates a culturally responsive learning environment, where mathematical concepts become more accessible through embedded practices of explaining and designing within traditional culinary activities (Khaerani et al., 2024).

As a theoretical implication, this study confirms that ethnomathematics in local culinary practices is not merely supplementary, but central to the development of early spatial literacy (Putra, 2022). Children’s ability to apply the concept of circles in various contexts after interacting with *Getuk Pisang* indicates evidence of knowledge transfer and long-term retention. Therefore, early childhood curricula grounded in local excellence hold significant potential to reform mathematics education by reconnecting it with its cultural roots and making it relevant to understanding the physical world (Weldeana, Hailu Nigus; Leung, 2025).

### Numeracy Literacy

The activity of counting skewers and slices of *Getuk Pisang* demonstrates that number concepts emerge functionally within children’s real-life contexts. Children did not engage in abstract counting, but rather counted with clear purposes, such as determining how many skewers to remove or ensuring fair distribution

among peers. This process shows that numerical understanding develops through meaningful concrete experiences rather than rote memorization (Jasmani et al., 2024).

This phenomenon aligns with the constructivist perspective, which posits that children construct mathematical knowledge through direct interaction with their environment (Ly et al., 2024). In this context, counting becomes a tool for solving real problems, making number concepts both useful and relevant. Children begin to develop an understanding of one-to-one correspondence and fairness in distribution, which are essential foundations of early numeracy.

Furthermore, this ability reflects the cognitive developmental stage of early childhood, particularly the concrete operational phase. At this stage, children more easily understand mathematical concepts through tangible objects that can be directly manipulated. Activities such as counting skewers and dividing food provide sensory and visual experiences that reinforce their understanding of quantity and equivalence (Handayani et al., 2025).

These findings are supported by studies emphasizing the importance of cultural context and daily activities in mathematics learning. The ethnomathematics approach highlights that local practices, such as sharing food, can serve as effective media for introducing number concepts in natural and meaningful ways. Thus, mathematics learning becomes not only an academic activity but also part of children's social and cultural experiences (Sape & Syamsuddin, 2025). This also reflects the principles of Realistic Mathematics Education (RME) developed by Freudenthal, where mathematics is viewed as a human activity closely connected to learners' realities (Mangundap et al., 2025).

### Non-Standard Measurement and the Development of Estimation

The exploration of *Getuk Pisang* length using fingers represents a form of non-standard measurement that is crucial for children aged 4–7 years. Before being introduced to standard units such as rulers, children must first understand the principles of measurement and comparison. The finding that children were able to arrange *Getuk Pisang* pieces from shortest to longest (seriation) indicates that they have achieved a key cognitive milestone in the preoperational stage, as described by Piaget (Siregar, 2025).

Children's ability to estimate weight (e.g., "the bigger one is heavier than the smaller one") also demonstrates an emerging understanding of the relationship between volume and mass. This supports the argument that ethnomathematics in local culinary practices provides a natural context for learning measurement. As noted by (Damayanti & Irfah, 2025) many traditional practices including food preparation embed sophisticated mathematical reasoning passed down through generations, which this study successfully captures at the level of children's understanding.

From the perspective of (Weldeana, Hailu Nigus; Leung, 2025), this non-standard measurement process reflects the universal mathematical activity of measuring, which is deeply embedded in cultural contexts. The use of fingers as measuring tools illustrates the synchronization between fine motor skills and quantitative reasoning. At this stage, children not only compare physical dimensions but also begin to construct an understanding of iterative units, where length is perceived as a repetition of smaller units (fingers). This finding highlights the role of *Getuk Pisang* as a transitional medium that facilitates movement from intuitive understanding toward more structured mathematical thinking.

Methodologically, data obtained through participant observation and validated through triangulation (Matthew B. Miles, A. Michael Huberman, 2014) reveal a significant pattern in the development of numeracy literacy. Children demonstrated improved ability to predict and verify measurement outcomes through repeated interaction with concrete objects. This has important pedagogical implications, suggesting that early childhood curricula grounded in local wisdom can bridge the cognitive gap between informal knowledge acquired at home and formal mathematics learning in school. Thus, *Getuk Pisang* transforms from a mere consumable product into a transformative educational instrument within ethnomathematics-based learning.

### Sociocultural Relevance and Character Values in Learning

It is important to note that mathematics learning through *Getuk Pisang* in Kediri does not occur in isolation. Character values and cultural identity are inherently embedded in the process. As children interact with this medium, they also learn about their local heritage. This reflects the concept of *Funds of Knowledge*, where knowledge from home and community is integrated into formal educational contexts (Milla Ignatesia Ginting, 2025).

The use of local media such as *Getuk Pisang* also reduces mathematics anxiety. Since the medium is familiar and enjoyable, psychological barriers to learning concepts perceived as "difficult" are minimized (Damayanti & Irfah, 2025). Consequently, learning becomes more inclusive and engaging. These findings

support the implementation of Indonesia's Merdeka Curriculum, which emphasizes local wisdom-based learning to develop the *Profil Pelajar Pancasila*, particularly in fostering global diversity awareness and critical thinking.

The process of non-standard measurement using fingers to explore the length of *Getuk Pisang* represents a crucial phase in the formation of children's cognitive schemas regarding units and iteration (Bujuri, 2018). The finding that children are capable of seriation confirms that physical interaction with *Getuk Pisang* effectively stimulates conservation of length and logical reasoning, key characteristics of the preoperational stage. Before being introduced to abstract standard units such as centimeters, children in Kediri have already developed a "sense of magnitude" through tangible local artifacts. This empirical experience provides a stronger foundation than symbolic introduction alone, as children construct mathematical understanding through meaningful and repeated physical actions (Arip Arizal Mustahidin et al., 2025).

Furthermore, children's ability to estimate weight based on volume ("the bigger one is heavier") reflects an integrated multivariate perception within the ethnomathematical context. This intuitive judgment demonstrates how children process spatial dimensions (volume) and mass simultaneously through tactile interaction with local culinary artifacts. It reinforces the idea that *Getuk Pisang* is not a static object, but an exploratory medium through which traditional practices such as wrapping and measuring become accessible to children's cognitive level (Jasmani et al., 2024). Thus, this activity successfully reveals the sophisticated mathematical reasoning embedded in local culture and transforms it into a concrete and contextual learning experience.

#### Limitations of the Study

This study has several limitations that should be acknowledged to contextualize its findings. First, the sample size is relatively small, involving only five children aged 4–7 years, which may limit the generalizability of the results to broader early childhood populations. Second, the study is geographically confined to Kediri, East Java, where *Getuk Pisang* is culturally embedded; therefore, the findings may not be directly transferable to regions with different cultural artifacts. Third, the qualitative design, while rich in contextual insights, relies heavily on observational interpretation, which may introduce researcher subjectivity despite triangulation efforts (Ilmianita & Ambarawati, 2025). Additionally, the study focuses primarily on short-term cognitive engagement without longitudinal tracking of children's mathematical development. Future research is encouraged to incorporate larger and more diverse samples, comparative cultural contexts, and longitudinal approaches to strengthen the validity and applicability of ethnomathematics-based learning (Ambar Arum & Silvia Anggraini, 2025).

#### Practical Implications and Recommendations for Early Childhood Education

The findings of this study offer several concrete implications for the implementation of ethnomathematics in early childhood education settings. First, educators are encouraged to integrate local cultural artifacts, such as *Getuk Pisang*, into daily learning activities to create meaningful and contextually relevant mathematical experiences. Teachers can design structured yet flexible activities, such as counting, sorting, slicing, and measuring, that align with children's developmental stages. Second, curriculum developers should incorporate ethnomathematics explicitly into lesson planning by connecting mathematical concepts with local wisdom and everyday practices. This aligns with culturally responsive pedagogy, ensuring that learning is both inclusive and engaging. Third, teacher training programs should emphasize the use of concrete and culturally relevant manipulatives to support early numeracy and geometry learning. Educators need to be equipped with strategies to facilitate guided exploration while allowing children to construct their own understanding. Finally, collaboration between schools and local communities is essential. Involving parents and local food producers can enrich learning experiences and strengthen the connection between home and school environments. By implementing these recommendations, PAUD institutions can foster not only mathematical competence but also cultural identity and character development in young learners.

#### Practical Implications for Early Childhood Education

The findings of this study provide concrete implications for the implementation of ethnomathematics-based learning in early childhood education settings. First, educators are encouraged to integrate local cultural artifacts, such as *Getuk Pisang*, as contextual learning media to introduce fundamental mathematical concepts. The use of familiar objects enables children to engage more actively in learning processes, as they can directly relate mathematical ideas to their daily experiences.

Second, teachers should design learning activities that emphasize hands-on exploration, such as slicing, counting, arranging, and comparing *Getuk Pisang*. These activities support the development of geometry, numeracy, and measurement concepts through meaningful interaction rather than abstract instruction. In addition, educators can incorporate guided questioning strategies to stimulate children's reasoning, for example by asking them to compare sizes, estimate quantities, or explain their observations.

Third, early childhood institutions should consider incorporating local wisdom into curriculum planning, particularly within thematic or project-based learning approaches. This integration not only enhances mathematical understanding but also strengthens children's cultural identity and socio emotional engagement. Furthermore, collaboration with parents is recommended to extend learning experiences into the home environment, allowing children to encounter consistent mathematical practices in both formal and informal contexts.

This study has several limitations. First, the participants were limited to children in the Kediri area, which may reflect specific sociocultural contexts not generalizable to other regions. Second, the study focused primarily on early-stage cognitive exploration and did not quantitatively measure long-term learning outcomes. Third, the relatively short observation period limited the ability to capture children's progression toward more complex mathematical concepts, such as advanced patterning or proportional reasoning.

## Conclusion

Based on the findings and data analysis, this study concludes that ethnomathematical elements embedded in the local culinary product *Getuk Pisang* function as an effective and contextually relevant learning medium for children aged 4–7 years. The study demonstrates that children's interactions with this medium facilitate the emergence of fundamental mathematical concepts, including three dimensional geometry (cylindrical forms), recognition of two-dimensional shapes (circular cross-sections), informal measurement (length, weight, and estimation), and early numeracy skills such as one-to-one correspondence and simple division.

These findings address the research objectives by showing that mathematical understanding can be constructed through meaningful engagement with culturally familiar objects (Utami et al., 2024). Rather than relying solely on abstract instruction, children actively participate in processes of exploration and interpretation, indicating that learning is both experiential and socially situated. The use of an educational ethnography approach further highlights the importance of concrete, culturally grounded media in supporting cognitive engagement and early mathematical reasoning.

The implications of this study suggest that integrating local cultural resources into early childhood education can enhance both conceptual understanding and cultural relevance. Such practices not only support mathematical development but also foster a sense of cultural identity among learners. Future research is recommended to expand the geographical scope, apply experimental or Research and Development (R&D) designs to validate instructional models, and investigate the long-term impact of ethnomathematical media on children's formal mathematical achievement.

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