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Ethnomathematical concepts in the slametan tradition for mathematics learning in elementary schools

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Abstract: Mathematics learning in elementary schools is often presented abstractly and remains disconnected from students' socio-cultural experiences. This study aimed to explore ethnomathematical concepts embedded in the *slametan* tradition of Central Javanese communities and analyze their potential as a resource for culturally responsive mathematics learning. A qualitative ethnographic approach was employed in Sukorejo Village, Kendal Regency, involving 150 community members. Data were collected from April 2025 to May 2026 through observations of six slametan events, semi-structured interviews, open- and closed-ended questionnaires, and documentation. The data were analyzed through data reduction, domain analysis, taxonomic analysis, ethnomathematical interpretation, and data presentation, while trustworthiness was strengthened through triangulation and member checking. The findings revealed that slametan incorporates concepts of numbers and arithmetic operations, fractions, ratios, measurement, estimation, geometry, patterns, symmetry, spatial arrangement, classification, time, and simple statistics. These concepts emerge in determining participant numbers, calculating food requirements, distributing *berkat*, measuring ingredients, arranging dishes, and organizing space and time. These mathematical practices are also intertwined with Javanese values of *rukun*, mutual cooperation, *tepa salira*, gratitude, fairness, and harmony. Therefore, *slametan* offers an authentic context for meaningful, contextual, and culturally responsive mathematics learning.

Keywords: Ethnomathematics, culturally responsive, slametan tradition

Abstrak: Pembelajaran matematika di sekolah dasar seringkali disajikan secara abstrak dan terputus dari pengalaman sosial-budaya siswa. Studi ini bertujuan untuk mengeksplorasi konsep etnomatematika yang tertanam dalam tradisi slametan masyarakat Jawa Tengah dan menganalisis potensinya sebagai sumber daya untuk pembelajaran matematika yang responsif secara budaya. Pendekatan etnografi kualitatif digunakan di Desa Sukorejo, Kabupaten Kendal, yang melibatkan 150 anggota masyarakat. Data dikumpulkan dari April 2025 hingga Mei 2026 melalui observasi enam acara slametan, wawancara semi-terstruktur, kuesioner terbuka dan tertutup, dan dokumentasi. Data dianalisis melalui reduksi data, analisis domain, analisis taksonomi, interpretasi etnomatematika, dan presentasi data, sementara kepercayaan diperkuat melalui triangulasi dan pengecekan anggota. Temuan menunjukkan bahwa slametan menggabungkan konsep bilangan dan operasi aritmatika, pecahan, rasio, pengukuran, estimasi, geometri, pola, simetri, pengaturan spasial, klasifikasi, waktu, dan statistik sederhana. Konsep-konsep ini muncul dalam menentukan jumlah peserta, menghitung kebutuhan makanan, membagikan berkat, mengukur bahan-bahan, menata hidangan, dan mengatur ruang dan waktu. Praktik-praktik matematika ini juga terjalin dengan nilai-nilai Jawa seperti rukun, kerja sama timbal balik, tepa salira, rasa syukur, keadilan, dan harmoni. Oleh karena itu, slametan menawarkan konteks otentik untuk pembelajaran matematika yang bermakna, kontekstual, dan responsif secara budaya.

Kata kunci: Etnomatematika, responsif secara budaya, tradisi slametan

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INTRODUCTION

Mathematics learning in elementary school plays a crucial role because it serves as the initial foundation for students to develop reasoning, logical thinking, problem-solving, and the ability to relate mathematical ideas to real-life situations (Bognar & Horvat, 2025; Lessing & Ogbonnaya, 2026; Sachdeva, 2021). At the elementary school level, children need learning experiences based on concrete examples to help them bridge the gap between informal knowledge gained from their surroundings and abstract formal mathematical concepts (Chen et al., 2025; Chen et al., 2026; Iyamuremye & Burns, 2025). Therefore, ideally, mathematics learning should be designed using contexts familiar to students' daily lives and relevant to the socio-cultural environment in which they grow and develop (Larasati et al., 2025; Sunzuma, 2025). However, current conditions demonstrate a significant gap between these ideal expectations and the reality on the ground. Elementary school mathematics instruction is often presented in a rigid, abstract, and procedural manner, often trapped in the memorization of formal formulas divorced from students' socio-cultural experiences (Mytra et al., 2026; Tumangger et al., 2024). The impact of this context-deprived learning approach is clearly reflected in the low numeracy skills of students in Indonesia. Based on the results of the 2022 PISA (OECD, 2023), Indonesian students' mathematics scores were only 366, far below the OECD average of 472. Recent data from various educational studies (Ario et al., 2025; Basid et al., 2025; Fardah & Kusumah, 2025; Prabawanto et al., 2024; Rum & Juandi, 2022) confirm that this condition is triggered by students' inability to use mathematical reasoning to interpret information and solve practical problems in real-life contexts.

To address this problem, mathematics in elementary schools must be contextualized. This contextualization is crucial so that mathematics is no longer viewed as a foreign, ivory-tower science, but rather as meaningful knowledge that functions in everyday life (Rubel & Mccloskey, 2021; Sigus & Mädamürk, 2024). Real-life examples of contextual mathematics can be found in community activities such as counting group members (Batiibwe, 2024), measuring area dimensions (Loviana et al., 2026; Umbara et al., 2023), estimating food volumes (Busrah & Pathuddin, 2021; Damayanti & Irfah, 2025), and dividing objects proportionally (Depascale et al., 2024; Kaya & Kesan, 2023). Theoretically, the close relationship between formal mathematical concepts and cultural practices of society is covered by the field of ethnomathematics. Ethnomathematics studies how certain cultural groups develop their unique mathematical ideas, methods, and practices to respond to the needs of everyday life (Setiaputra et al., 2025).

Procedurally, the implementation of ethnomathematics in formal learning is adopted through the Culturally Responsive Pedagogy approach. This learning procedure positions students' cultural knowledge, language background, local symbols, and community experiences not merely as ornaments or additional illustrations in the classroom, but as primary sources (authentic resources) for building academic understanding (Hartoyo et al., 2025; Kumar & Gopinath, 2025). The teacher begins the learning procedure by highlighting local cultural phenomena already familiar to students, guiding them to identify informal mathematical aspects within them, deconstructing the concepts, and finally formalizing them into standard mathematical symbols or formulas through meaningful group discussions. So far, the application of ethnomathematics in elementary schools in Indonesia has explored various physical cultural objects (artifacts), such as woven fabric motifs (Nahak et al., 2026), traditional house architecture (Aras & B, 2025; Asdamayanti et al., 2025; Dewi et al., 2025), handicrafts (Wulandari et al., 2025), traditional foods (Djamiri et al., 2026), and patterns in traditional games (Afghohani et al., 2024). Several previous studies have also begun to look at social traditions, including the *slametan* tradition (Clariza & Budiyono, 2023; Wahyuni & Huda, 2024). However, there is a significant gap that distinguishes this research from previous studies. The majority of previous studies only focused on identifying static geometric shapes or surface number patterns in ritual objects. This research is intended to do more than just consider the *slametan* tradition of Central Javanese society as just a thing of the past, but rather as a living and dynamic social practice. The difference is that it does not just analyze the broad mathematical concepts, such as numbers, fractions, ratios, non-standard estimation, geometry, and simple statistics in the distribution of blessings and portioning, but has also made an explicit connection between them and the philosophical values of Java, which include *rukun* (harmony), gotong royong (mutual cooperation), tepa salira (community service), and harmony.

With this dynamic, the purpose of this study is to delve deeply into the ethnomathematics concept of Central Javanese society in the *slametan* tradition and analyze its potential as a medium for learning mathematics in a culturally responsive manner in elementary schools. Given the need to revitalize basic mathematics learning to be more humanistic, meaningful and contextual in children in the Central Java region, this research is urgently needed. This research can be theoretically useful to enrich the literature on ethnomathematics social activity in theory. From the practical aspect, the findings of this exploration give tangible contribution to the elementary school teacher in making educational learning aids, student worksheets and contextual numeracy learning based on local wisdom as well as a medium to maintain local culture for future generations.

METHOD

This study is a qualitative study with an ethnographic approach. The research design was developed by adapting four main ethnographic questions to guide data collection and analysis: the location of the tradition, the form of the tradition, the mathematical concepts involved, and its cultural/philosophical meaning. The study was conducted in Sukorejo Village, Sukorejo District, Kendal Regency, Central Java. The location was selected purposively because the local community still preserves the *slametan* tradition. The study subjects consisted of 150 community members (90 men and 60 women aged 25–79) who were purposively selected based on their direct involvement in and knowledge of the *slametan* tradition (including community leaders, traditional/religious leaders, hosts, food preparers, and ritual participants).

The researcher acted as the main instrument (key instrument), supported by auxiliary instruments in the form of an observation guide (developed specifically to record and note mathematical activities that arise naturally in the *slametan* tradition, such as activities of counting the number of participants, measuring food ingredients, estimating portions, dividing food, as well as classifying and arranging objects or spaces), a semi-structured interview guide (conducted by compiling a semi-structured question protocol containing question guides regarding the history and purpose of *slametan*, the sequence of ritual activities, the reasons or rules behind the use of certain numbers, the shape of food, measurements, arrangement of dishes, and the cultural values inherent in them), a questionnaire sheet (open and closed) (designed in the form of an open and closed questionnaire divided into 4 main parts, namely: (1) participant profiles and their experiences, (2) closed questions regarding the type, frequency, elements, and procedures of *slametan*, (3) open questions regarding the symbolic meaning of *ubarampe*, blessings, *tumpeng*, *tampah*, distribution of food, and spatial arrangement, and (4) items to capture community perceptions about the potential of *slametan* as a source of learning mathematics Elementary school), and documentation format (Created systematically to record, categorize, and analyze visuals (photos/recordings) related to geometric shapes and mathematical patterns (such as the cone shape of a *tumpeng* (rice cone), the circle of a *tampah* (wine basket), the symmetry of dishes, and cooking ratios). Data were collected over a 13-month period (April 2025–May 2026) using four main techniques:

1. Observation: Directly observing six *slametan* (ceremonial gatherings) to identify mathematical activities (counting, measuring, estimating, dividing, and spatial planning).
2. Interviews: Conducted with key informants to explore the history, symbolic meaning of *ubarampe* (rice cone), and cultural values.
3. Questionnaires: Distributed to 150 respondents to gather profiles, perceptions, and understandings related to *slametan* as a source for learning mathematics.
4. Documentation: Taking photographs, recording audio, collecting local archives, and related literature to analyze geometric shapes and mathematical patterns (such as the cone shape of a *tumpeng* (rice cone) and the circle shape of a *tampah* (wine basket).

Data Analysis Techniques Data collection was conducted in stages through five ethnographic steps:

1. Data Reduction: Sorting data relevant to the research focus (ethnomathematics and culturally responsive mathematics learning).
2. Domain Analysis: Identifying general categories of mathematical traditions and concepts.
3. Taxonomic Analysis: Breaking down the domain into more detailed mathematical components (such as number concepts, geometry, fractions, ratios, and simple statistics).
4. Ethnomathematic Interpretation: Connecting cultural activities (e.g., the shape of a *tumpeng* (rice cone), sharing blessings) with elementary school mathematics concepts and Javanese philosophical values (*rukun, gotong royong*, etc.).
5. Data Presentation: Presenting the results of the analysis in the form of narrative descriptions, concept classification tables, and learning integration maps.

Data Validity Checking (Validity) Data validity was ensured through technical triangulation techniques (comparing observations, interviews, questionnaires, and documentation), source triangulation (comparing information from various subject profiles), and member checking to reconfirm the interpretation results with key informants.

RESULTS AND DISCUSSION

The *slametan* tradition of the Central Javanese society is a rich cultural tradition that combines social, religious and mathematical aspects. The *slametan* was understood as an important tradition in order to seek safety, express gratitude, make social harmony, and make relationship balance between human and god, human other and human, human and environment through the questionnaires, interview and observation and documentation which are involved with 150 community members. *Slametan* is not just a ceremonial ritual, but a cultural practice which represents togetherness' values, spatial configuration, symbolic forms, distribution, measurement, calculation, and order. To strengthen the evidentiary basis of the findings, the interpretation of ethnomathematical concepts in this study was supported by field notes, interview excerpts, open-ended questionnaire responses, and visual documentation, all of which were organized using anonymous data codes. Representative evidence from the data corpus illustrates how community members understand *slametan* as a practice of safety, gratitude, and harmony. A community elder explained:

> *"Slametan* is a way for us to ask for blessings and express gratitude. When neighbors gather, pray together, and share food, they feel more at peace and closer to one another. What matters most is not the quantity of food, but the harmony, sincerity, and peace among the residents*."* (I7, interview, 14 August 2025).

This statement shows that *slametan* is valued not only for its ritual elements, but also for its role in fostering togetherness, sincerity, and social harmony within the community. From Geertz (1973) perspective, the ritual elements and social functions of *slametan* are not two separate entities. Togetherness, sincerity, and social harmony are formed, displayed, and maintained through the performance of the ritual. Therefore, the phrase "not only because of its ritual elements, but also its role" should not create the impression that rituals are merely ceremonial, while social functions lie outside of them. Geertz (1960) places *slametan* as one of the core rituals in the religious and social life of Javanese society. Furthermore, Geertz (1960) in The Religion of Java, discusses *slametan* specifically covering patterns, meanings, life cycles, village celebrations, and their relationship to Javanese social integration. This is also in line with research conducted by Adiputro et al. (2024)which shows that *slametan* strengthens social capital, social engagement, bonds between residents, and emotional support. The mathematical practice of counting and equal distribution was also evident in the preparation of *berkat* packages. A participant involved in food preparation stated:

> "When planning a *slametan*, my mother and I usually calculate in advance how many neighbors and relatives we'll invite. If we invite 50 people, we'll prepare at least 50 packages, sometimes a little more if there are additional guests. Each package contains roughly the same amount, including rice, side dishes, and snacks, so everyone gets a fair share" (I23, interview, 18 September 2025).

This excerpt indicates that the preparation of *slametan* involves mathematical reasoning, particularly in estimating the number of participants, determining the number of *berkat* packages, and ensuring fair distribution. This statement indicates that the preparation of a *slametan* is an arena for constructing mathematical knowledge, not simply the mechanical application of calculations. From a cognitive constructivist perspective, participants construct and adjust their knowledge schemas based on previous *slametan* experiences: the number of guests is estimated by considering the invitation list, attendance patterns, the number of family members, and the possibility of additional guests; the number of blessing packages is determined through one-to-one correspondence, addition, multiplication, and provision of reserves; while fair distribution involves division, fractions, ratios, and proportional reasoning (Piaget, 1970).

This knowledge is then socially constructed through conversations, comparisons of estimates, corrections, and joint decision-making among the host, family members, cooks, and residents involved in the *rewang*. This is in accordance with social constructivism, which asserts that mathematical understanding is formed through interactions with others and the environment and becomes meaningful when used to solve real-life problems and cultural practices of the community (Mangwende, 2026; Vygotsky, 1978). Thus, estimating the number of participants can be understood as informal statistical modeling based on data and experience; Determining the amount of blessings is a form of quantitative and multiplicative reasoning; while ensuring fair distribution requires argumentation about whether "fair" means the same amount for each individual or proportionally based on the size of the family and the recipients' needs.

This interpretation is supported by Nursyahidah et al. (2025), who found that the Javanese cultural context helps students develop a more meaningful understanding of statistics, and Purwasi et al. (2025), who showed that the context of traditional food supports the development of understanding of ratio and proportion. Therefore, *slametan* can be understood as an authentic constructivist context that bridges informal community mathematics with formal concepts, while simultaneously showing that mathematical reasoning is always related to social and ethical considerations regarding the adequacy, accuracy, and fairness of distribution.

Field-note evidence further supported the interpretation of geometric concepts, patterns, and symmetry in *slametan* practices. In one of the observed *slametan*, the field notes described as follows:

> "The *tumpeng* was positioned in the middle of a round *tampah*, and various side dishes like vegetables, eggs, fried chicken, and traditional snacks were laid out around it, following a balanced and repetitive pattern. The circular shape of the *tampah*, the conical form of the *tumpeng*, and the radial arrangement of the surrounding dishes clearly showed geometric ideas related to circles, cones, spatial orientation, patterns, and symmetry" (O3, birth *slametan*, 22 October 2025).

This observation demonstrates that the arrangement of slametan dishes provides a concrete representation of mathematical ideas, particularly plane geometry, solid geometry, spatial orientation, and symmetry. Field notes O3 show that the arrangement of slametan dishes can be read as a form of geometric knowledge that lives in cultural practices, not just aesthetic decoration. In D'Ambrosio (2006) ethnomathematics perspective, mathematics grows from the way a cultural group organizes, explains, and solves its life problems; therefore, the circular tampah, the cone-like tumpeng, and the repeated placement of side dishes around a center are mathematical expressions born from the community's cultural activities, even though they are not expressed in formal terms and formulas.

Based on Bishop (1997) universal mathematical activity framework, these practices primarily include designing, namely organizing forms to produce orderly and balanced arrangements; locating, namely determining the position of the center of the edge, direction, distance, and relationship between objects; and explaining, namely providing cultural, functional, and aesthetic reasons for the arrangement.

Mathematically, the position of the tumpeng at the center of the tampah forms a center-circumference relationship; the radial arrangement of side dishes represents the radius, direction, central angle, cyclical sequence, and spatial orientation; while the repetition of elements at relatively regular distances or directions can be modeled as patterns and rotational symmetry if there are n groups of dishes spaced equally, each group ideally occupying a central angle of 360^∘/n while pairs of dishes placed opposite each other can be analyzed as reflection symmetry. However, the term "balanced" in field notes does not always mean absolutely precise geometric symmetry; such balance can also be visual, proportional, or symbolic.

In Duval (2006) theory of semiotic representation, the arrangement of the food functions as a concrete figural register that only becomes a means of complete mathematical understanding when its visual form is converted into verbal and symbolic registers, such as "circle," "cone," "center," "radius," "angle," "rotation," and "axis of symmetry"; thus, learning does not stop at the activity of naming the shape, but includes the analysis of its properties, relationships, transformations, and spatial regularity. This interpretation is strengthened by the research of Wulandari et al. (2025), who found geometric elements in the tradition of the tumpeng procession; and research by Loviana et al. (2026), which identified geometric shapes, symmetry, patterns, and spatial relationships in traditional cultural artifacts and objects.

Pedagogically, cultural objects that can be seen and manipulated help bridge abstract geometric concepts with concrete experiences; However, these observational notes primarily prove the existence of mathematizable structures, not automatically proving that slametan participants consciously use formal concepts of circles, cones, or symmetry; To avoid imposing academic mathematical categories on cultural practices, the findings need to be triangulated through interviews regarding the arrangement rules, reasons for placement, ways of maintaining balance, and local terms used by tumpeng makers, in line with Xu and Ball (2024) who emphasize the need to distinguish between identifying mathematical structures in culture and understanding the underlying knowledge systems of the society.

Open-ended questionnaire responses also showed that community members perceived slametan as relevant to children's mathematics learning. One respondent wrote:

> "*Slametan* can help children learn mathematics because they can see directly how adults count the number of guests, prepare food packages, divide food fairly, measure ingredients, and recognize the shapes of *tumpeng* and *tampah*. Children are more likely to understand mathematics when it is connected to cultural practices they already know" (R42, open-ended questionnaire).

This response indicates that *slametan* can serve as an authentic cultural context for introducing mathematical concepts in elementary schools, especially counting, measurement, division, geometry, and culturally meaningful problem solving. R42's assumption suggests that society does not view *slametans* merely as cultural objects to which math problems can be attached, but as authentic social practices where mathematical knowledge is used, observed, and passed down through generations.

From the perspectives of social constructivism and situated learning, children construct understanding through observation, conversation, imitation, and gradual participation in meaningful activities with more experienced people; while the theory of funds of knowledge positions household and community knowledge as a legitimate intellectual resource for school learning (Lave & Wenger, 1991; Moll et al., 1992; Vygotsky, 1978). Thus, the activities of counting guests, estimating the amount of a gift, measuring ingredients, dividing food, and recognizing the shapes of *tumpeng* (rice cone) and winnowing baskets are informal mathematization processes, namely transforming real-world problems into quantities, operations, sizes, shapes, spatial relationships, and problem-solving decisions. Within the framework of Realistic Mathematics Education, students' imaginable and recognizable experiences serve as a starting point for progressively moving from informal strategies such as counting by one, using local measures, or dividing by the number of families to tables, diagrams, arithmetic operations, standard units, fractions, ratios, and formal generalizations (Freudenthal, 1973).

Aguirre et al. (2024) study of 56 learning implementations in grades III–V showed that real-world objects and situations close to students' experiences were able to generate a variety of mathematical ideas and problem-solving activities, so that authentic contexts not only helped students answer questions but also recognize problems that were worthy of being mathematized. This finding is in line with Pongoliu (2025) who reported that Payango traditional house-based geometry learning in 30 elementary school students resulted in significantly better mathematical understanding than conventional accompanied by increased motivation, engagement, and perceptions of mathematical relevance. Purwasi et al. (2025) also showed that the traditional dish *lemang* can be a context for gradually building an understanding of ratio and proportion while strengthening cultural appreciation.

However, the presence of cultural elements alone does not guarantee meaningful learning. Putra et al. (2025) emphasized that ethnomathematics tasks must include mathematical structures, procedures, representations, and reasoning that are truly derived from cultural practices, not simply using cultural names or images to decorate the problem. Therefore, *slametan* has the potential to be a culturally responsive mathematics learning context if students are involved in observing real data, making estimates, measuring, comparing strategies, formulating problems, explaining the reasons for divisions deemed fair, and translating these cultural experiences into formal representations and concepts. The responses of one respondent represent evidence of perception and pedagogical potential, not direct evidence of effectiveness, so claims of improved learning outcomes still need to be tested through classroom implementation, pre-post assessments, observations of the mathematization process, and student reflection.

The results indicate that there are *slametan* types known to Central Javanese communities, such as birth slametan, *mitoni*, *selapanan*, wedding *slametan*, death *slametan*, moving-house *slametan*, *bersih desa*, harvest *slametan*, and religious *slametan*. From the 150 respondents the majority said they had participated in the slametan tradition either as an organiser, through participation or by helping in the preparation of food and equipment. The *slametan* is naturally a community engagement and as such, mathematical practices are emerged in determining the number of invitees, calculating the ingredients and needs for food, the number of portions, arranging the food, the *berkat* and its distribution, the time when the event is to be held and the organization of the space for the event. Thus, *slametan* can be understood as a social space in which communities practice mathematics contextually without always referring to it as "mathematics."

These findings suggest that *slametan* can be understood as a community quantitative management system, using mathematical reasoning to coordinate people, time, space, and resources to ensure the event proceeds smoothly. Based on the theory of distributed cognition, the knowledge to determine the number of guests, ingredient requirements, portion sizes, timing, and spatial layout resides not solely within the mind of a single individual, but is distributed among the host, family members, *rewang* (rewang), measuring instruments, records, food containers, and the collective experience of the community (Hutchins, 1995). Thus, mathematics in *slametan* serves not only to produce accurate calculations but also to manage uncertainty in the number of guests, prevent food shortages or waste, harmonize the division of tasks, and ensure the distribution of blessings that are deemed appropriate and fair. Research by Fatmawati et al. (2025) supports this interpretation by showing that traditional culinary practices involve estimation, proportional reasoning, inventory management, work order, and food quantity planning to ensure sufficiency while avoiding waste. This is also in line with Taja-on et al. (2025), who place quantitative reasoning, collaboration, social responsibility, and ethical decision-making as important dimensions of the application of mathematics in real life. Therefore, the involvement of 150 respondents in various roles shows that *slametan* is not only a place where informal mathematical concepts are discovered, but a collective mechanism for negotiating adequacy, efficiency, responsibility, and social justice through quantitative decisions.

Fig. 1. *Ubarampe* and dishes in the *slametan* tradition as cultural objects containing concepts of number, grouping, measurement, ratio, and classification

The first mathematical concept found in the *slametan* tradition is the concept of numbers and arithmetic operations. This concept appears in the activities of determining the number of participants, the number of food portions, the number of *berkat* packages, the number of *ubarampe*, the number of *tampah*, the number of side dishes, and the amount of rice or ingredients that must be prepared. In practice, the community members estimate based on experience, such as calculating rice needs for 30, 50 or 100 people, number of side dishes, and the number of *berkat* containers to be given to each participant. The activities show the application of addition and subtraction, multiplication and division in real life scenarios. For elementary mathematics learning, these practices are applicable to teaching whole numbers, arithmetic operations, estimation and contextual problem solving.

These findings indicate that the practice of *slametan (slametan)* is not simply about implementing arithmetic operations, but also fosters number sense and quantitative anticipation in situations of uncertainty. According to the framework of McIntosh et al. (1992), number sense encompasses an understanding of quantity, relationships between numbers, the influence of operations, the choice of strategies, and the assessment of the reasonableness of results. This is evident when people use the number of guests as a reference to convert the needs of 30, 50, or 100 people into the number of rice, side dishes, winnowing baskets, containers, and blessing packages. This practice also demonstrates the important distinction between quantities that must be precise, such as one blessing package for each recipient, and quantities that must be flexibly estimated, such as the need for rice, the presence of guests, and reserve supplies. Therefore, *slametan* can be a context for quantitative modeling that encourages students to establish assumptions, determine units per person, choose operations, scale quantities, and check whether the results are reasonable and sufficient.

This potential is important because. A study by Fajri (2025) also emphasized that mathematical modeling in elementary schools serves to bridge real-world problems with mathematics and mathematical literacy. Thus, the pedagogical value of *slametan* lies not only in the use of addition, subtraction, multiplication, and division, but also in the opportunity to train students to choose between exact and approximate calculations, assess adequacy, and account for their quantitative decisions in a real cultural context.

Fig. 2. Representation of number concepts and arithmetic operations in the distribution of *slametan berkat*

The second concept found is fractions, division, and ratios. The *slametan* tradition always involves the activity of distributing food fairly to participants, whether in the form of *nasi berkat*, snacks, side dishes, or other offerings. In this distribution process, the community uses the principle of proportionality so that the amount of food corresponds to the number of people present.

For example, one *tampah* of rice can be divided into several parts, one *ayam ingkung* can be divided into several portions, or one container of snacks can be allocated to a certain number of guests. This practice indicates the concept of fractions as parts of a whole, equal sharing, and ratios between the amount of ingredients and the number of participants. In elementary mathematics learning, this context can be used to explain simple fractions, ratios, scale of needs, and fair distribution.

The practice of sharing blessings shows that fractions in *slametan* do not only represent "parts of a whole", but integrate several meanings of fractions at once: one *ingkung* divided among a number of people represents fractions as a quotient; each participant receives (1/n) shares indicating fractions as operators; the comparison of the amount of food with the number of recipients forms a ratio; while the uniformity of the size of each portion is related to the fraction as a measure. The fraction subconstruct knowledge framework emphasizes that a deep understanding of fractions requires the ability to move between the meanings of part–whole, quotient, operator, ratio, and measure; even the situation of dividing something that has not been arranged into equal parts is a higher cognitive demand than simply recognizing the parts that are already available Schadl and Lindmeieer (2025).

The context of the *slametan* also shows that "fair" is not always synonymous with "equal": distribution can be based on the number of recipients, number of family members, needs, or cultural conventions, so children need to distinguish arithmetic equality from proportionality and social justice. Research by Adelia et al. (2025) showed that fraction division tasks helped fifth grade students establish part–whole relationships, but their main difficulty was determining the appropriate reference whole and coordinating it with proportional reasoning. Cross-cultural study of Arani et al. (2024) also show that linking fractions with fair distribution can bring together conceptual understanding of mathematics and social values, although the meaning of justice is influenced by society's cultural script. This is confirmed by Sumpter et al. (2026), who found that sharing problems encourage children to use mathematical and ethical arguments, for example sharing equally, based on needs, or based on effort. Thus, distribution of blessings is a rich pedagogical context for developing understanding of fractions, ratios, and division while training students to explain reference units, maintain proportional relationships, and provide reasons why a distribution is considered fair.

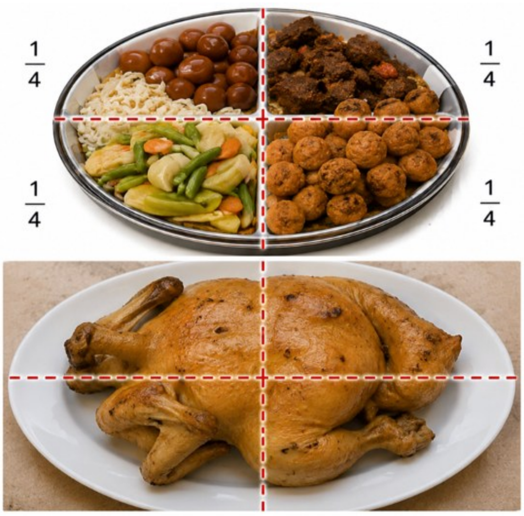

Fig. 3. Distribution of *slametan* food as a representation of fractions and ratios

The third concept is measurement and estimation. At the preparation stage of *slametan*, community members use various units of measurement, both standard and non-standard. Measurement appears in activities such as measuring rice, coconut milk, spices, water, sugar, coconut, and other food ingredients. In traditional practice, quantities are often expressed through local units such as "a handful," "as needed," "one *tampah*," "one basin," "one pot," or "one package." Formal mathematical units (kilograms, liters, or grams) are not always found in these activities, but they do include an important estimation of mathematical understanding. The community can use experience, intuition and habit to make the necessary adjustments to the number of participants for the amount of ingredients needed. This indicates that the measurement of culture is not only a numerical measurement, but one of practical experience as well. In elementary mathematics learning, this context can be used to introduce standard and non-standard units, estimation, unit conversion, and measurement of mass and volume.

These findings suggest that local units such as “a handful,” “one *tampah*,” “one basin,” or “enough” are not simply less formal forms of measurement, but rather pragmatic reference units calibrated through repeated experience and adapted to the objectives of the activity. In conceptual measurement theory, measuring involves more than just reading numbers on a tool, but also includes recognizing attributes, selecting units, comparing quantities, repeating units, and assessing the accuracy of the results Lehrer (2003). Therefore, the experience of cooking at *slametans* serves as reference knowledge: people compare current needs with previous experiences, then adjust measurements based on the number of participants, the characteristics of the ingredients, and the desired level of sufficiency. This process constitutes a reasoned estimation of measurements, not a baseless guess.

Peters and Prediger (2025) showed that the ability to estimate mass depends on mastering the measurements of familiar objects as benchmarks and strategies for comparing new quantities to these benchmarks; in a randomized trial of 310 fifth-grade students, instruction that explicitly trained in estimation strategies yielded better outcomes than instruction that focused solely on unit conversion. H. Chen et al. (2025) also found that utilizing everyday understanding and informal measurements opened up opportunities for deeper exploration of measurement concepts, Thus, the pedagogical value of *slametan* practice does not stop at introducing standard and non-standard units, but lies in the opportunity for students to test the consistency of local units, compare results between individuals, relate them to grams or liters, calculate possible differences, and determine when measurements need to be precise and when estimates are sufficient. This learning instills the understanding that the quality of measurement is determined by the appropriateness of the units, the level of accuracy, the purpose, and the context in which they are used.

The fourth concept is plane and solid geometry. The forms of food and equipment in *slametan* contain various geometric elements. *Tumpeng* represents a cone, *tampah* represents a circle, pieces of food may form triangles, squares, or rectangles, while containers and food arrangements may display particular spatial patterns. *Tumpeng* as one of the main elements of a number of *slametan* not only has cultural and spiritual values but can also be used as a medium of understanding of the concepts of cones, height, curved surfaces, circular bases, and simple volume concepts. *Tampah* can be used to introduce the notions of circle, radius, diameter, circumference and area. Thus, the cultural forms in *slametan* have the potential to become concrete mathematics teaching aids close to students' lives.

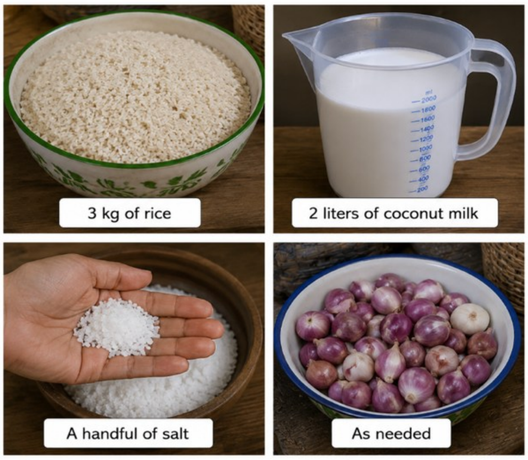

Fig. 4. Measuring food ingredients in the preparation of *slametan*

These findings indicate that *tumpeng* and winnowing baskets have the potential to bridge visual recognition to geometric abstraction, not simply as examples of cone-shaped and circular objects. Based on figural concept theory, geometric understanding is formed through the integration of the visual image of an object and the conceptual properties that define the shape (Fischbein, 1993). Therefore, *tumpeng* needs to be understood as a real object modeled to resemble a cone, not a complaetely ideal mathematical cone, while winnowing baskets are an approximation to a circle, which in mathematics is defined by the equality of distances of each point on the circumference to the center. Within Van Hiele (1986) geometric framework, observing cultural forms can lead students from the visualization stage of recognizing shapes based on their appearance to the analysis stage by identifying circular bases, vertices, heights, radii, diameters, and curved surfaces, and then to informal reasoning through comparison, measurement, and the relationship between size and volume.

Gustina and Mariana (2025) study also showed that the combination of cultural context and three-dimensional visualization helped students understand spatial relationships and manipulate objects mentally. Thus, the pedagogical value of *tumpeng* and winnowing baskets lies in the activities of idealizing, measuring, comparing, and explaining the properties of shapes, for example, estimating the volume of a *tumpeng* or relating the diameter of a winnowing basket to its circumference, so that students move from visible similarities in shape to a formal understanding of geometric definitions, properties, and relationships.

The fifth concept is pattern, symmetry, and spatial arrangement. In *slametan*, food is not placed randomly, but arranged according to certain patterns. Dishes on a *tampah* are often arranged around *tumpeng* or another central point, forming a radial pattern. Some types of snacks, side dishes, and complementary foods are also placed in balance on the left and right sides or around the center of the arrangement. The pattern illustrates ideas of symmetry, order, repetition and spatial orientation. In some *slametan*, the seating arrangement of participants can be circular or facing, or in rows, depending on the space and local customs of the community. In the elementary learning area, these patterns can be used to help introduce number patterns, shape patterns, reflection symmetry, rotational symmetry, position, direction and layout.

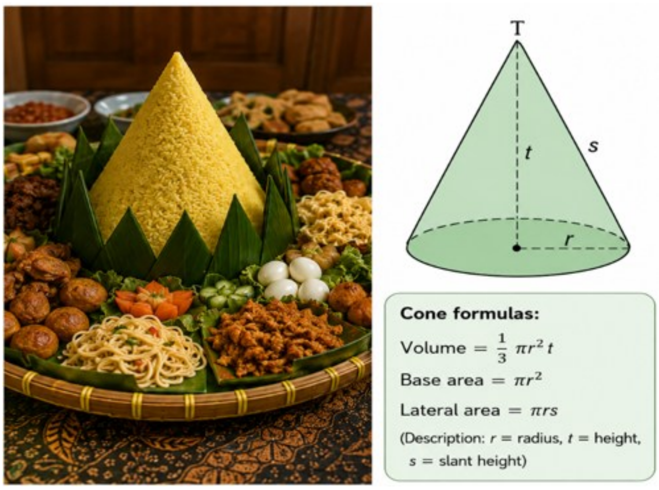

Fig. 5. *Tumpeng* in the *slametan* tradition as a representation of a cone

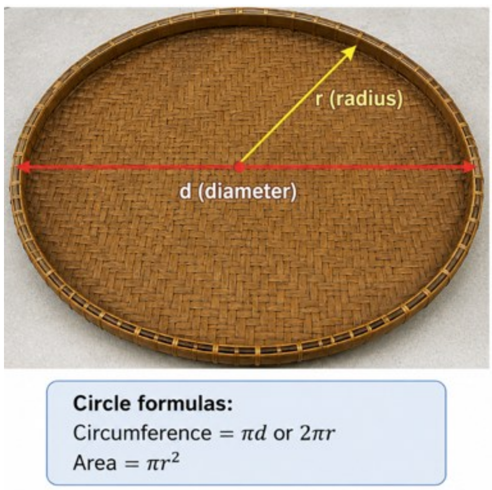

Fig. 6. *Tampah* as a representation of the concept of a circle in elementary mathematics learning

These findings suggest that the arrangement of dishes and the positioning of participants in a *slametan* constitute a relational structure formed by rules of center, repetition, balance, direction, and transformation, rather than simply a visually appealing arrangement. Based on the Awareness of Mathematical Pattern and Structure (AMPS) theory, mathematical understanding develops when students are able to recognize the regularities and consistent relationships behind the varying appearance of an object (Mulligan & Mitchelmore, 2009).

The arrangement of side dishes around a *tumpeng* (rice cone) can be interpreted as the repetition of a unit through rotation about a center point; the placement of elements in pairs on the left and right sides represents a reflection on an axis; while the pattern of sitting in a circle, facing each other, or in a row develops an understanding of relative position, direction, and changes in orientation. Mulligan (2025), found that understanding of spatial patterns does not stop at recognizing "repeating units," but involves dynamic visualization, orientation, and transformation in approximately 60% of student responses. Acosta et al. (2026) also showed that patterns presented through real situations and concrete objects are more easily recognized than abstract patterns and help children begin to transfer regularities to other representations as a basis for algebraic generalization. Findings on Papuan woven motifs reinforce that cultural patterns can contain reflection, rotation, and translation transformations that can be developed into contextual geometry learning (Jaizul & Putra, 2025). Therefore, the learning potential of *slametan* is not enough to be realized by asking students to name the type of pattern or symmetry, but needs to be directed at activities to find basic units, determine repetition rules, identify axes and angles of rotation, predict subsequent arrangements, and explain structures that remain when the shape or position of elements is changed.

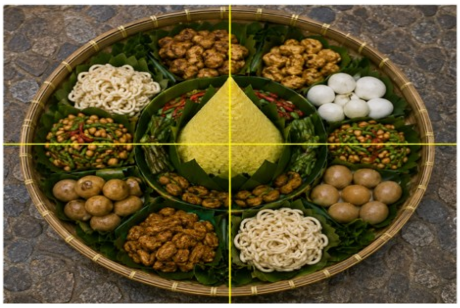

Fig. 7. Radial patterns and symmetry in the arrangement of *slametan* dishes

The sixth concept is simple statistics. The data obtained from 150 respondents show that the *slametan* tradition can be used as a context for introducing data collection, grouping, presentation, and interpretation. Because respondents were allowed to mention more than one type of *slametan*, the frequencies in Figure 8 represent multiple responses rather than mutually exclusive categories. The categories presented in the figure are Birth *Slametan*, Wedding *Slametan*, Death *Slametan*, Moving House *Slametan*, Village Cleansing *Slametan*, and others. These data may be organized into tables, bar charts, pictographs, or basic pie charts that are appropriate for elementary school students' developmental stage. Therefore, *slametan* tradition is applicable not only to the study of numbers and geometry, but also to contextual statistics learning.

These findings suggest that data on *slametan* types can be used to develop transnumeracy, the process of transforming raw data into classifications, tables, and visualizations to make previously unseen patterns interpretable (Wild et al., 2011). However, because each respondent may mention more than one type of *slametan*, the unit of analysis must be distinguished between the number of respondents and the number of responses; as a result, total frequencies can exceed 150 and percentages by respondent can total more than 100%.

This provides an important context for developing critical statistical literacy, as students learn not only to graph but also to question how the data were collected, what was counted, which representations are appropriate, and what conclusions can be justified. For multi-response data, bar charts or pictograms are more appropriate than pie charts, because the categories do not form mutually exclusive parts of a whole; pie charts are only appropriate when the categories are mutually exclusive and the sum of the proportions is 100% (Office for National Statistics, 2026). A review by Friedrich et al. (2024) demonstrated that authentic problems and real-world data are effective in developing K–12 statistical literacy, while Hasanah et al. (2024) emphasized the importance of the ability to understand, compare, and interpret various data representations in fifth-grade students. Thus, *slametan* data has pedagogical value when students are asked to explain why the total number of responses exceeds the number of respondents, compare frequencies between categories, select valid graphs, and draw conclusions that remain tied to the context and structure of the data.

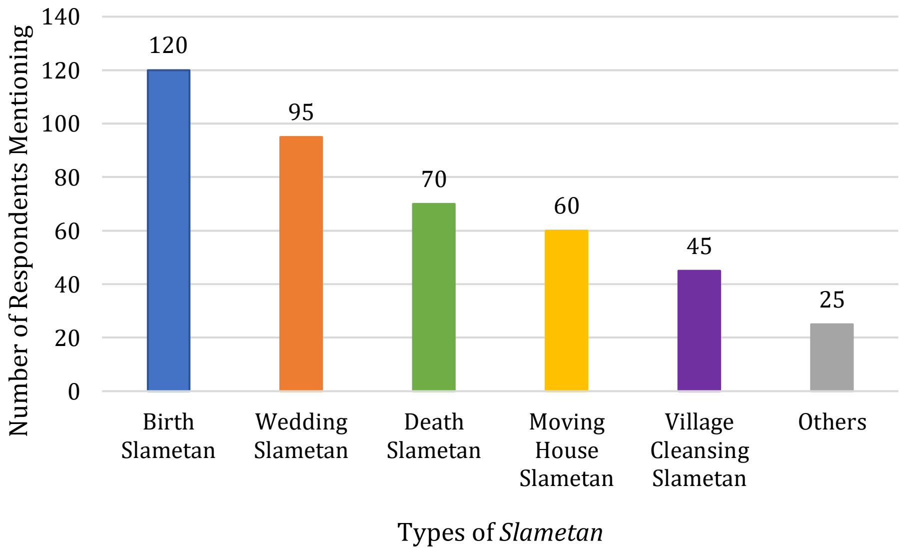

Fig. 8. Types of *slametan* known by Central Javanese communities

In addition to mathematical concepts, the findings show that the *slametan* tradition contains strong Javanese cultural values, such as *rukun*, *gotong royong, tepa salira, andhap asor,* gratitude, *eling*, togetherness, balance, and safety. The value of *rukun* is reflected in the togetherness of residents who attend and pray for one another. *Gotong royong* appears in the process of preparing food, arranging the space, distributing *berkat*, and helping the host family. *Tepa salira* appears in the principle of distributing food fairly and showing consideration for guests. Gratitude is reflected in the prayers and intentions underlying the *slametan*. These values are important to integrate into culturally responsive mathematics learning because learning is oriented not only toward cognitive achievement, but also toward character formation and students' cultural identity.

These findings suggest that the values of harmony, mutual cooperation, mutual respect, and gratitude, and *eling* should not be placed as additional moral messages after mathematics learning, but rather as values of mathematics education realized through the way students reason, communicate, collaborate, and make decisions; because mathematics learning always carries values through tasks, interaction norms, and actions that are considered right and proper in the classroom (Bishop, 2004). In the context of *slametan*, harmony and mutual cooperation can be realized through collaborative problem solving and shared responsibility; mutual respect and gratitude through a willingness to listen to others' strategies and formulate divisions that take into account needs; while gratitude, *eling*, balance, and safety can be developed through reflection on sufficiency, waste, accuracy, and the social consequences of quantitative decisions. This approach aligns with culturally sustaining pedagogy, which places language, values, identity, and community knowledge as the epistemic foundation of learning, not merely illustrations to explain formal concepts (Luecke, 2025).

Recent research shows that character values are most strongly felt in mathematical communication (Nurhayati et al., 2024), mutual cooperation develops when students explore and evaluate concepts in groups (Sunarni et al., 2025), and integration of local culture can strengthen cultural pride, motivation, engagement, empathy, cooperation, tolerance, and mutual respect (Phathona & Basuki, 2026; Susanti et al., 2025). Thus, *slametan* has the potential to connect mathematical competence, cultural identity, and social character, but the formation of these values does not occur automatically; teachers need to design problems, role assignments, dialogues, and reflections that explicitly reconcile mathematical accuracy with caring, responsibility, and social harmony. Based on the analysis, the ethnomathematical concepts in the *slametan* tradition can be mapped as follows (Table 1).

Table 1. Mapping of analysis results: Ethnomathematical concepts in the *slametan* tradition

Elements of the *Slametan* Tradition	**Mathematical Concepts**	**Javanese Cultural Values**	**Potential for Elementary Mathematics Learning**
Determining the number of invitees and estimating attendance	Whole numbers, counting, addition and subtraction, estimation, one-to-one correspondence	*Rukun*, togetherness, *tepa salira*, responsibility	Counting and comparing quantities, arithmetic operations, estimation, and contextual problem-solving
Calculating rice, side dishes, snacks, and other food requirements	Multiplication, division, ratio, proportional reasoning, quantitative modelling	*Gotong royong*, balance, prudence, responsibility	Multiplication and division, proportional relationships, scaling quantities, and evaluating the reasonableness of results
Preparing the number of *berkat* packages according to the number of participants	Counting, grouping, multiplication, one-to-one correspondence, estimation of reserves	Fairness, *tepa salira*, *rukun*, concern for others	Number operations, grouping, estimation, correspondence, and solving problems involving additional or unexpected guests
Distributing rice, *ingkung*, side dishes, snacks, and *berkat*	Fractions as part–whole, quotient and operator; division,	Justice, *tepa salira*, balance, togetherness	Simple fractions, division, ratio, proportional reasoning, and mathematical–ethical

	ratio, equal and proportional sharing		discussions about fair distribution
Measuring rice, water, coconut milk, sugar, spices, and other ingredients	Measurement of mass and volume, standard and non-standard units, estimation, unit conversion	Carefulness, balance, *eling*, responsibility	Comparing standard and local units, measuring mass and volume, converting units, estimating, and discussing measurement accuracy
Using local measures such as "a handful," "as needed," one basin, one pot, or one *tampah*	Informal measurement, benchmark quantities, approximation, comparison, practical calibration	Local wisdom, simplicity, adaptability, prudence	Investigating the consistency of non-standard units, comparing measurement results, and connecting informal units with grams, kilograms, or litres
Tumpeng as the central *slametan* dish	Cone, circular base, radius, height, curved surface, surface area, and volume	Gratitude, safety, balance, symbolic centrality	Identifying and analysing solid figures, measuring radius and height, estimating volume, and distinguishing real objects from ideal geometric models
Tampah and food containers	Circle, radius, diameter, circumference, area, spatial boundary	Balance, order, simplicity, harmony	Exploring the properties of circles, measuring radius and diameter, and solving problems involving circumference and area
Triangular, square, or rectangular food pieces and containers	Plane figures, sides, angles, perimeter, area, classification	Order, balance, aesthetic harmony	Identifying, classifying, comparing, and measuring plane figures in culturally familiar objects
Radial arrangement of dishes around the *tumpeng*	Repeating patterns, radial patterns, rotational symmetry, angles, central orientation	Harmony, balance, order, togetherness	Identifying repeating units, rotational symmetry, central angles, spatial orientation, and predicting pattern continuation
Balanced placement of dishes on the left and right sides	Reflection symmetry, congruence, relative position, visual proportion	Balance, harmony, *tepa salira*	Identifying lines of symmetry, reflecting shapes, comparing positions, and explaining whether arrangements

			are mathematically or visually balanced
Circular, facing, or row seating arrangements	Position, direction, distance, spatial relationships, geometric configurations	*Rukun*, *andhap asor*, mutual respect, togetherness	Describing position and direction, drawing simple layouts, comparing seating configurations, and solving spatial arrangement problems
Organising the kitchen, prayer area, food-placement area, and guest space	Spatial planning, area, capacity, classification, optimisation	*Gotong royong*, order, safety, responsibility	Drawing floor plans, estimating capacity, arranging objects efficiently, and solving problems involving area and spatial organisation
Determining the sequence and time of preparation and implementation	Time measurement, duration, sequencing, addition and subtraction of time	Discipline, *eling*, order, responsibility	Reading clocks, calculating duration, sequencing activities, and constructing timelines or schedules
Classifying *ubarampe*, side dishes, snacks, containers, and ritual equipment	Classification, grouping, set relationships, counting frequency	Order, cultural awareness, respect for tradition	Sorting objects according to attributes, forming groups and sets, constructing classification tables, and comparing frequencies
Recording the types of *slametan* recognised by 150 respondents	Data collection, multiple-response data, frequency, categorisation, tables, bar charts, and pictographs	Cultural identity, appreciation of diversity, togetherness	Collecting and classifying data, distinguishing respondents from responses, constructing tables and bar charts, and interpreting contextual data
Collaborative preparation through *rewang*	Distribution of tasks, sequencing, quantitative coordination, allocation of resources	Gotong royong, *rukun*, *andhap asor*, responsibility	Collaborative problem-solving, planning resources, allocating tasks, and communicating mathematical strategies
Collective prayer and expressions of gratitude during *slametan*	Order and sequence as supporting structures rather than explicit formal computation	Gratitude, *eling*, safety, harmony, spiritual balance	Reflecting on the cultural meaning of mathematical decisions and integrating accuracy, responsibility, care, and cultural identity into mathematics learning

The mapping shows that mathematical knowledge in *slametan* is embedded in the coordination of quantities, measurements, food distribution, geometric forms, spatial organisation, patterns, and community data. Its pedagogical value lies not only in connecting cultural objects with formal concepts, but also in integrating mathematical reasoning with fairness, responsibility, cooperation, cultural identity, and social harmony.

CONCLUSION

This study concludes that the *slametan* tradition constitutes an authentic socio-cultural context in which mathematical knowledge is naturally practiced, negotiated, and transmitted through activities such as determining participants, estimating food needs, preparing and distributing *berkat*, measuring ingredients with standard and local units, arranging *tumpeng* and dishes, organising time and space, and presenting community data. These practices embody concepts of whole numbers, arithmetic operations, fractions, division, ratios, measurement, estimation, plane and solid geometry, patterns, symmetry, spatial relationships, classification, time, and simple statistics. More significantly, the mathematical practices are intertwined with the Javanese cultural values such as *rukun, gotong royong, tepa salira, andhap asor*, gratitude, eling, fairness, balance, responsibility, safety, and social harmony.The study therefore contributes to ethnomathematics by positioning *slametan* not merely as a collection of cultural objects containing mathematical forms, but as a living social system that integrates quantitative reasoning, ethical decision-making, cultural identity, and collective responsibility. *Slametan* can be used in elementary education to assist culturally responsive mathematics learning through contextual tasks that involve estimation, proportional sharing, measurement, geometric modelling, pattern generalisation, spatial planning, and data interpretation, but its cultural meanings and local procedures need to be maintained rather than abstracted into the classroom as a decorative context. As this ethnographic study was in one Central Javanese community and the potential of *slametan* as a pedagogical approach was explored, further study is needed to design and test *slametan*-based learning materials in other regions and study their impact on the understanding of mathematics, literacy, character and cultural identity.

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