



Ethnomatematics Practices in The Traditional Funeral Rituals of The East Noemuti Community

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Abstract

Traditional funeral rituals contain many mathematical concepts that have not been widely explored. Therefore, this study aims to investigate the mathematical activities contained in the traditional death rituals of the East Noemuti community. The study uses a qualitative, ethnographic approach. The research subjects included atoinamaf (uncles/traditional elders), bereaved families, and community leaders in Haekto Village, East Noemuti District, North Central Timor Regency. Data were collected through observation, interviews, and documentation, and then analyzed using Spradley's ethnographic analysis techniques, including domain analysis, taxonomy, component analysis, and cultural themes. The results of the study show that in the traditional death rituals of the Noemuti Timor community, there are various ethnomatematical activities, including: (1) tutu panu, which represents a hemispherical space; (2) making coffins and digging rectangular graves of a certain size; (3) nailing the coffin with three blows, symbolizing the concept of sacred numbers; (4) the use of circular silver coins as a symbol of spiritual provisions; and (5) the practice of calculating time in the tanono procession. The traditional death rituals of the East Noemuti community are spiritually and culturally meaningful, rich with mathematical concepts that can be used as a source of contextual learning.

Ritual pemakaman tradisional mengandung banyak konsep matematika yang belum banyak dieksplorasi. Oleh karena itu, penelitian ini bertujuan untuk menyelidiki aktivitas matematika yang terkandung dalam ritual kematian tradisional masyarakat Noemuti Timur. Penelitian ini menggunakan metode kualitatif dengan pendekatan etnografi. Subjek penelitian meliputi atoinamaf (paman/sesepuh tradisional), keluarga yang berduka, dan pemimpin masyarakat di Desa Haekto, Kecamatan Noemuti Timur, Kabupaten Timor Tengah Utara. Data dikumpulkan melalui observasi, wawancara, dan dokumentasi, kemudian dianalisis menggunakan teknik analisis etnografi Spradley, yang meliputi analisis domain, taksonomi, analisis komponen, dan tema budaya. Hasil penelitian menunjukkan bahwa dalam ritual kematian tradisional masyarakat Noemuti Timur, terdapat berbagai aktivitas etnomatematika, antara lain: (1) tutu panu, yang melambangkan ruang setengah bola; (2) pembuatan peti mati dan penggalan kuburan persegi panjang dengan ukuran tertentu; (3) memaku peti mati dengan tiga pukulan, melambangkan konsep angka keramat; (4) penggunaan koin perak bundar sebagai simbol bekal spiritual; dan (5) praktik menghitung waktu dalam prosesi tanono. Ritual kematian tradisional masyarakat Noemuti Timur bermakna secara spiritual dan budaya, kaya akan konsep matematika yang dapat digunakan sebagai sumber pembelajaran kontekstual.

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Introduction

Mathematics is not merely a collection of abstract formulas, but rather a method of thinking used to formulate, apply, and interpret real-life situations in various circumstances. The framework of mathematical literacy emphasizes that mathematical skills should be evident when students can make decisions and solve problems in their daily lives (Deda et al., 2023; OECD, 2022). In learning applications, there is often a gap between school mathematics and students' life experiences, so strengthening contextual teaching is a necessity, especially in areas rich in customs and traditions.

In Indonesia, strengthening learning based on figures and socio-cultural conditions is in line with policies to strengthen personality and space to adapt the curriculum to local conditions. The Personality Learning Strengthening Policy explains the importance of developing noble values and wisdom that exist within the community (Amsikan & Deda, 2020a). Meanwhile, the Merdeka Curriculum provides space for learning adaptation based on the characteristics of students and local socio-cultural conditions, as outlined in project activities (Kemendikbudristek, 2022).

One relevant approach to bridging school mathematics with indigenous/cultural conditions is ethnomathematics, the study of mathematical practices that develop and grow within indigenous communities, and methods of turning them into meaningful learning experiences (Deda, Disnawati, et al., 2024; Hidayati & Prahmana, 2022; Iffah et al., 2025). Research trends show that ethnomathematics is growing and contributing to the strengthening of mathematical literacy through the exploitation of local cultural wealth. Empirical evidence in Indonesia also shows that ethnomathematics-based learning has a positive impact on mathematics achievement and learning attitudes, making it worth considering as a contextual and engaging learning alternative (Hartoyo et al., 2025). In addition, the integration of ethnomathematics is being promoted through the development of models, teaching materials, and even culture-based digital media, which expands the opportunities for its implementation in schools (Amsikan & Deda, 2020b; Deda et al., 2026; Deda & Disnawati, 2019; Deda & Maifa, 2021b, 2021a).

North Central Timor Regency (TTU) in East Nusa Tenggara Province is an area with strong cultural traditions that are alive in the community's life cycle. One of its districts is Noemuti, where various traditional rituals are still practiced as guidelines for communal living. In the death rites of the Noemuti community, for example, the family will first inform the *atoenamaf* (uncle from a certain line who plays a traditional role). The presence of *atoenamaf* is key in preparing for ceremonies and funerals, including the implementation of traditional customs and symbolic actions at the doorstep of the house as part of the delivery (e.g., counting, measuring, grouping, comparing, sorting, and arranging space), which can be articulated into a context for learning mathematics.

Ethnomathematics studies at TTU have explored many specific cultural activities, such as traditional markets and the *Adat thelas keta* in Noemuti, which incorporate concepts of sets, arithmetic operations, social arithmetic, and comparisons (Kou et al., 2021; Kou & Deda, 2020). Other studies

also highlight Timorese/TTU cultural artifacts such as richly patterned woven fabrics, traditional measurements, and counting activities (Banase et al., 2022; Deda & Amsikan, 2019). In addition, exploration of traditional architectural elements on the island of Timor reveals concepts of geometry and number patterns related to fundamental mathematical activities (Nindya & Puspita, 2022; Tlonaen & Deda, 2021). However, special analysis describes the mathematical activities of the death rites of the people of East Noemuti as very limited or unexplored. Based on this explanation, this research aims to explain the mathematical activities in ethnomathematics investigations in the traditional death ceremonies of the people of East Noemuti, so that it can be used as a basis for the development of more meaningful mathematics tasks or teaching materials for students.

Research Method

This study uses a qualitative method with an ethnographic approach, conducted in Haekto Village, East Noemuti District, North Central Timor Regency. It was carried out in the even semester of the 2025/2026 academic year with a primary focus on traditional death rituals as the object of research. The data used is primary, obtained directly from the field through interaction with research subjects and observation of the research object, supported by interviews and documentation.

The research subjects consisted of three people who were selected based on criteria related to their roles and involvement in the procession. First, Atoinamaf (uncle) consisting of one person (male, 54 years old) as the main figure of the ritual who led the *natoni* (traditional speech), performed *tutu panu* (breaking the coconut shell), began digging the grave, and performed *kusa nakaf* (nailing the coffin). Second, one member of the bereaved family (female, 52 years old) who was responsible for providing the necessities for the ceremony, giving permission, and acting as the main witness to the procession. Third, one community leader/traditional elder (male, 60 years old) who was responsible for explaining the cultural values and symbols of the ritual and coordinating the involvement of residents in the traditional procession.

Data collection techniques in this study were conducted through observation and interviews. Observations were carried out by researchers going directly to the research location to clearly observe the implementation of the traditional death rituals of the Noemuti people, in order to obtain data on the rituals from an ethnomathematical perspective, so that the information obtained was in line with the research design concept and could be used as material for reflection and reference in the next steps.

Next, interviews were conducted to obtain an objective picture of the ritual, with the following steps: the researcher visited the funeral home as the research location, participated in a series of traditional ceremonies while observing the ritual led by AtoinAmaf as the research subject, then interviewed AtoinAmaf and supplemented the data with documentation as evidence of the direct implementation of the research. The data analysis technique used was Spradley's sequence of analysis

approaches, namely domain analysis, taxonomic analysis, component analysis, and cross-cultural theme analysis (Amsikan et al., 2023; Deda, Rosa, et al., 2024; Deda & Disnawati, 2024; Uskono et al., 2023).

Research Results and Discussion

Research Results

Based on observations, interviews, and documentation, several main activities were found in the traditional death ceremonies of the East Noemuti community in Haekto Village. Important parts of the traditional death ceremony activities include preparing the body before placing it in the coffin, preparing the grave, and the day of the funeral ceremony, which includes Kusa nakaf (nailing the coffin), tutu panu (breaking the coconut shell), as well as the procession and burial. Information regarding the funeral procession of the deceased in East Noemuti was analyzed using domain analysis, taxonomic analysis, component analysis, and traditional theme analysis.

Domain Analysis

The first step in analyzing information is domain analysis. Domain analysis aims to identify important areas of analysis that are the focus of investigation. Based on the results of the research, the researchers created an ethnomathematics domain in the traditional death rituals of the people of East Noemuti. The traditional death rituals of the Noemuti people are rituals inherited from their ancestors and have been passed down from ancient times to the present day. In their daily routines, the people of Noemuti always perform rituals that are considered necessary as a special form of respect, for example, in situations related to birth, marriage, and death. The custom of the Noemuti community that is performed at death ceremonies is Tutu Panu. This ceremony is unique and loved by all groups of people, both the elderly and the young.

The domains that are the focus of this study are coffins, Tutu Panu (titi tempurung), funerals, sacrificial animals, and artifacts given to the deceased. The Tutu Panu ceremony is performed to honor the spirits of ancestors or family members who have passed away, in accordance with the belief that they are returning to the creator (Usi Neno). It is also believed that Tutu Panu can protect spirits from evil influences that may wish to disturb them. Tutu Panu usually attracts a lot of attention from the surrounding community and is attended by neighboring tribes.

Taxonomic Analysis

The second stage in data analysis is taxonomic analysis. Based on the activity domain determined by researchers in the initial stage of data analysis, researchers then decide on taxonomic analysis. After the domain is determined, the next stage is to organize the taxonomy in order to describe activities into

more detailed categories and subcategories. Based on field data, the traditional death rituals of the East Noemuti community can be broken down into five major categories, as shown in Table 1.

Table1. Scope and Stages of Traditional Death Rituals of the East Noemuti Community

Scope	Ritual Stage	Leading Actor	Tools	Times range
Preparing the corpse	Bathing and dressing of the funeral body	Close family, Atoin Amaf (uncle)	ea water, traditional cloth or clothing	± 1 - 2 hours
Set up a place for people to grieve	Preparation of the funeral venue	The bereaved family, the neighborhood	Bed, tent, flower pot, coffin	± Half a day
	Support and prayers	Family, community, traditional/religious shops	Candles, prayer books, hymns	2 nights, 3 days
Period of mourning	Grave preparation	Atoin amaf, community/family	gravedigger's tools, chicken, Sopi, betel nut	± 1 day
	Burial	Family, Atoin Amaf, Traditional Leader	Sacrifices (food, sacrificial animals, money, cloth)	2-3 days
	Funeral blessing prayer	Religious leader	Altar, Holy Bible, Holy Water	± 1-2 hours
	<i>Kusa Nakaf</i>	Aoin Amaf	Hammers, nails, Lopeo Temef silver coins	± 30 minuts
Funeral ceremony	<i>Tutu Panu</i>	Atoin Amaf	Coconut shells, stones, coins	± 30 minutst
	Cemetery	Atoin amaf, community/family	Coffin, grave	± 1-2 hour
	Closing prayer and closing remarks	Atoin amaf, traditional elders, family	Sopi, siri pinang, food	After the funeral (2-3 days)
Mourning period and memorial after burial	Mourning period and memorial	Family, close relatives	andles, crosses, food, corn, sacrificial animals	4 nights (Nono Matane + 40th day memorial)

The series of mourning rituals in this tradition generally begins with the preparation of the body, which includes washing it with water, dressing it in traditional clothing, covering the eyes and feet, and cutting the Beti thread. This is followed by the preparation of the mourning site, which involves cleaning the house, setting up a tent, providing flower pots, informing the family and village officials of the death, and appointing a person in charge of the kitchen. followed by guarding and lying in state, which includes guarding the body for 2 nights and 3 days, performing traditional rituals (*Natoni*), and giving sacrifices (food, animals, money, or cloth); then the funeral ceremony, which includes nailing the coffin (*Kusa Nakaf*), the tutu panu ritual, the procession of the body, and digging a grave of a certain size (approximately 1 meter deep and rectangular in shape); and concluded with a period of mourning and commemoration through gatherings for 4 nights, periodic commemorations (e.g., 40 days), the implementation of Tanono or Nono Matane (certain taboos), and the distribution of sacrifices.

Componential Analysis

The third stage in data analysis is component analysis. At this stage, researchers seek more detailed data from the traditional death rituals of the East Noemuti community to discover ethnomathematics in the form of mathematical concepts, principles, and algorithms. The results of the component analysis are shown in Table 2, which lists the shapes of the tools used in the traditional death rituals of the East Noemuti community.

Table 2. Scope of Component Analysis

No.	Objects	Component Types	Description	Conceptualization
1	Coffin	Coffin	It is shaped like a composite flat structure made of teak wood and used for storing corpses	Composite shapes: trapezoids and quadrilaterals
		Coconut shell	Shaped like a circle and half a sphere from one whole coconut. Used as one of the ritual tools in Tutu Panu.	Circle, Half Sphere
		Silver Coin	Shaped like a circle and used as a ritual tool for treating ringworm, passed down from ancestors.	Circle
2	Tutu Panu	Stone	Shaped round and can be chosen from various types of stones. With the purpose of the stone is also a ritual tool for <i>Tutu Panu</i> .	Circle
		Traditional Tutu Panu ritual process	This traditional tutu panu ritual is performed by Atoinamaf (biological uncle) when carrying the body from the house to the burial site. Tutu panu is shaped like a half sphere.	Half Sphere
3	Funeral	Graveyard	Rectangular in shape, with a depth of about 1 meter. Intended for burying corpses	Rectangle Straight line, block
4	Sacrifice of grief	Cows and pigs	Cows and pigs are sacrificial animals brought to funerals as a sign of condolences for the deceased	Quantity
		Beti Fabric	rectangular blanket as a last gift	Rectangle, straight line, symmetry equilateral triangle
5	Offering for the deceased	Money	Rectangular money as a sign of mourning for the deceased	Rectangle
		Basket	A circular basket (Pone) used to hold clothes to be given to the	Circle

The objects in Table 2 in the traditional mourning ceremony in East Noemuti consist of a coffin in the form of a mixed background (a combination of a trapezium and a rectangle) made of wooden boards as a container for storing the body; in the *Tutu Panu* (*titi tempurung*) ritual, several items are used, namely a tempurung (pictures 1.a and 1.b) made from a whole coconut in the shape of a circle and a half sphere, silver coins in the shape of a circle as heirlooms from ancestors, and stones (picture 1c) selected from various types in the shape of a sphere or circle. Meanwhile, the ritual procession is

carried out by *AtoinAmaf* (grandfather) when the body is taken from the house to the burial site in a half-spherical formation.

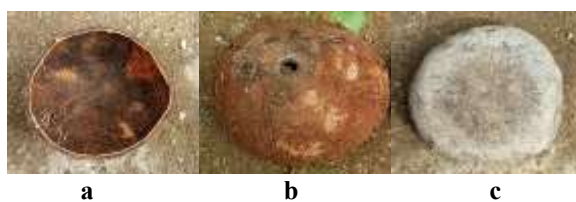


Figure 1. a. The shell appears open, b. The shell appears closed, c. Titi stone

Next, the burial uses a rectangular grave with a depth of approximately ± 1 m as a place to bury the body (representing straight lines and block spaces); in mourning sacrifices, cows and pigs are brought to the funeral home as a sign of grief that emphasizes quantity; after that, gifts for the deceased include beti cloth designed with symmetrical elements and geometric shapes (rectangles, straight lines, and isosceles triangles or *belahkapat*) as symbols of mourning, rectangular-shaped money as a sign of grief, and a circular basket (*Pone*) that serves as a medium for clothing to be given to the deceased.

Thematic Analysis

The final step in data analysis is thematic analysis, which examines the meaning that arises from the structure of traditional death rituals in Haekto Village. The results of the research reveal four important themes. First, the icon of spirit liberation is evident in the *tutu panu* ritual and traditional teachings (*naton*) as a sign that the deceased's connection with the world has ended. Second, the structure and size of the rituals can be understood as geometric representations, such as the coconut shell in the shape of a hemisphere, the coffin in the shape of a composite structure, and the grave in the shape of a rectangle.

Third, there are calculations of duration and patterns of repetition, such as guarding the body for 2 nights and 3 days, nailing the coffin 3 times, and periodic commemorations such as 40 days after death. Fourth, the symbolic value and economic distribution evident in the use of money as provisions for the soul or offerings, and the giving of food and betel nut during the mourning process as a form of togetherness and social support.

These themes were confirmed during the interviews, so it can be claimed that the traditional death rituals of the people of East Noemuti have a religious-cultural role and are rich in ethnomathematical patterns that are manifested in the form of geometry, duration estimates, numbers, and quantitative distribution. In this theme analysis, a description of ethnomathematical findings in the form of mathematical concepts will be presented.

Ethnomathematics in Traditional Funeral Rituals

1) The Concept of Plane and Solid Shapes

a) Circle

Based on research findings, circular shapes were found on coconut shells, silver coins, stones, and baskets. The circular shape on silver coins symbolizes spiritual provisions or transportation for spirits to the afterlife. These silver coins are believed to help spirits pass through the gates of the afterlife and ensure a smooth journey. In addition, silver coins also symbolize prosperity and abundance, as well as representing the appreciation and bond between the family left behind and the deceased.

The circular shape found on stones has an important meaning that symbolizes various aspects of life and death. The stone is not just an inanimate object, but a symbol of strength, continuity, and the relationship between the living and the dead. The circular shape of the basket symbolizes a place to store items given by the bereaved family or belongings of the deceased. The basket will be placed in the grave along with the coffin.

b) Ball

Based on the results of the research, the shape of a hemisphere was formed by coconut shell artifacts. A hemisphere is part of a whole coconut that is cut into two equal parts.

c) Composite flat shape

Based on the results of the research, composite flat shapes or combinations of trapezoids and quadrilaterals are also found on coffins. Coffins have a deep symbolic meaning, namely as a container for the deceased and as a bridge connecting the world of the living with the afterlife, as well as symbolizing the final journey of the deceased.

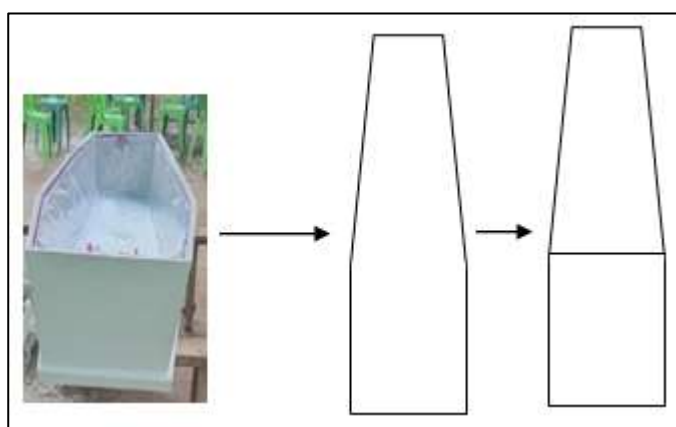


Figure 2. Composite flat shape

The structure of the combination or combination of a trapezoid and a rectangle on a coffin is a structure formed from two shapes, namely a trapezoid and a rectangle, where both are attached to one side. Furthermore, this coffin is formed by regular and irregular trapezoids. This shape is adapted to the condition of a corpse whose body is larger than its legs.

d) Rectangle

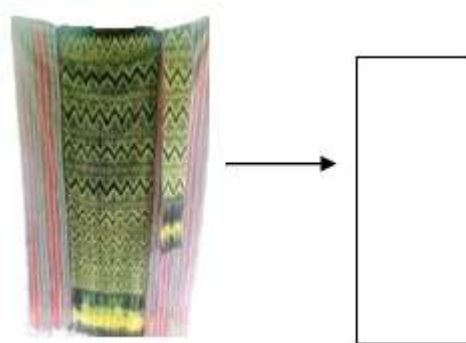


Figure 3. Rectangle

The concept of rectangles can be found in burial artifacts or burial sites, beti cloth, and paper money. Rectangles in burial sites or graves, beti cloth, and paper money are two-dimensional shapes with four sides, two pairs of which are parallel and equal in length.

e) Beams

Based on research findings, straight lines are found on the edges of the burial site and also on the beti cloth (Figure 3). A straight line is a line that has no curvature and extends indefinitely in both directions, connecting two points with the shortest distance. Meanwhile, the grave is rectangular in shape, which is suitable for the size of the coffin. The contents or volume of the grave pit are also filled with belongings or gifts from relatives to the deceased. East Noemuti people believe that there is a journey in the world of death, so symbolic equipment is needed. The shape of the grave pit resembles a rectangular beam structure.

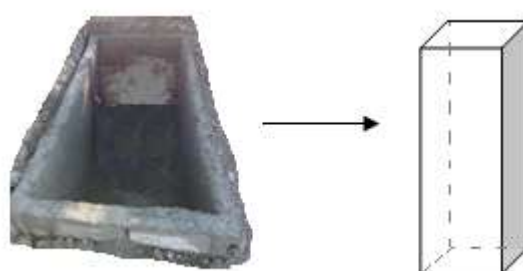


Figure 4. Concept of spatial design, beams

2) Cultural Values in Traditional Funeral Rituals

The era of globalization has brought major changes to the lives of people around the world. Its influence is felt in various fields (economics, technology, lifestyle, culture, socio-politics) and has affected the culture and identity of communities. Technological advances have indeed brought many benefits to Indonesia, but at the same time they can erode local culture. If the tutu panu tradition is not preserved by the Noemuti community, it may become nothing more than a story of the past. Tutu Panu is a ritual that has unique value and reflects the life of the Noemuti community. Tutu panu is

sacred and existed before religion entered the Noemuti region. Its implementation is closely related to the community's belief system and their relationship with nature.

3) Benefits of Traditional Funeral Rituals in Noemuti Society

The Noemuti community believes that performing the traditional death ritual of *tutu panu* will ease the passage of the deceased and free them from grave abuse. Not only that, reciting the Quran at the house of mourning can strengthen faith and help the bereaved family to be patient in facing the tragedy that has befallen them. This traditional death ceremony is performed to send off the deceased.

This ritual conveys the closeness between the deceased and their family members and creates closeness and complete faith in the Supreme Being believed and trusted by the Noemuti community as *Uis Neno* (God). Generally, the Noemuti community believes that establishing a connection with the Supreme Being will bring goodness, proof, and security in their lives. Therefore, the Noemuti people view this ritual as a sacred ritual that protects them. The benefits of the traditional death ritual are also intended to be preserved for generations to come so that it will always be practiced.

Discussion

The series of traditional death rituals of the East Noemuti community in Haekto Village, starting from the preparation of the body, the preparation of the mourning place, the period of guarding/wake, to the funeral ceremony (*Kusa Nakaf*, *Tutu Panu*, carrying–burial) and the period of mourning/remembrance, shows that death is understood as a transition process that must be organized. This organization is evident in the relatively fixed sequence of tasks, the division of roles among the actors (especially *Atoin Amaf*, family, traditional elders, religious leaders), and the use of specific artifacts that cannot be replaced arbitrarily. From a cultural communication perspective, rituals function as a mechanism for maintaining community. These cultural communication rituals unite people in grief, reinforce the value of togetherness, and ensure that social transitions proceed smoothly (Costa, 2020).

The findings of this study show that rituals in Haekto have two major functions that run simultaneously. The psychosocial function provides a space for families and communities to express their grief, calm their anxieties, and restore a sense of order after loss. The next function is the normative function, which ensures that what is done is considered correct according to custom (and also religion, as seen from the existence of blessing masses). Recent studies on death and grief in Indonesia, particularly during the pandemic, show that when rituals are accelerated/restricted, families tend to feel unfulfilled and resist because rituals are understood as a socio-cultural and religious necessity, not merely an addition. This reinforces why the East

Noemuti community strictly maintains the stages of its rituals and involves many people (Adu et al., 2023).

The findings of ethnomathematics are compelling because mathematics here is present as a way of life. Communities measure, organize space, determine sequences, calculate time, establish repetition numbers, and regulate distribution. This is in line with the trend in Indonesian ethnomathematics research, which emphasizes how communities reason and solve everyday problems through local knowledge, often focusing on the themes of geometry, measurement, and patterns (Iffah et al., 2025).

These findings are consistent with other empirical research in ethnomathematics-based mathematics learning, which show that culturally appropriate mathematical methods are pedagogically beneficial. Studies on ethnomathematics integration in classrooms reveal that it improves students' conceptual understanding, mathematical communication, and engagement by making learning more meaningful and contextually (Amsikan & Deda, 2020b; Deda & Maifa, 2021a).

In this context, the study's findings are substantially confirmed by Deda et al's research, particularly in the Timor cultural background. Deda et al. regularly show that local cultural practices are rich in mathematical ideas that can be converted into learning materials. For example, research on the usage of Ume Kbbubu as a framework for teaching geometry demonstrates that when children are exposed to familiar cultural items, they develop a better comprehension of spatial ideas (Amsikan & Deda, 2018, 2020b; Tlonaen & Deda, 2021). Other research on traditional games and cultural activities in border communities reveals imbedded concepts like numbering systems, patterns, and logical structures that are consistent with classroom arithmetic (Amsikan et al., 2023; Benyamin et al., 2023; Deda et al., 2026; Deda, Rosa, et al., 2024; Deda & Disnawati, 2024; Taus et al., 2022; Uskono et al., 2023).

Furthermore, more recent research shows that incorporating ethnomathematics into digital learning media (e.g., culturally contextualized worksheets) improves students' numeracy skills and motivation (Deda et al., 2026). These findings demonstrate that ethnomathematics is more than just a study of cultural artifacts; it has been scientifically proven as an effective approach to mathematics instruction. As a result, the ethnomathematical patterns found in East Noemuti's death rituals have a high potential for use as contextual learning materials.

Mathematical logic activities are clearly seen in: (a) the selection of artifact forms (coffins, shells, graves, baskets), (b) rules of duration and repetition (2 nights and 3 days, 3 nails, 40 days), and (c) quantity and distribution (sacrificial animals, food, siri-pinang, and money). Thus, ethnomathematics in the death rituals of East Noemuti can be understood as a system of transition, whereby mathematics becomes a cultural tool to make the event of death manageable, measurable, orderly, and meaningful.

The theme of releasing the soul is carried out as a finalization of the deceased's social status. *Natoni* in oral tradition narratives and performances contains values, identity, and legitimacy. The release of the soul confirms who the deceased is in the kinship network, what the family must do, and how the community should place this event in their collective memory. Research on *natoni* among the Dawan/Atoin Meto ethnic group confirms its function as a means of preserving local identity and strengthening cultural values that are passed down through oral traditions (Jayanti, 2022).

Meanwhile, *Tutu Panu* (breaking coconut shells) can be interpreted as a symbolic act that seals the separation. It is simple in material terms, but powerful in social terms because it is performed at a critical moment (when the body leaves the house for the grave) and led by an authoritative traditional actor. This is where symbols become effective because of the timing of their implementation, the legitimacy of the actors, and public witness. The results of the component analysis above show that the geometric is dominant concept.

- 1) Circles (silver coins, shells, stones, baskets) mark objects that accompany the journey (provisions/offerings/containers). Symbolically, endless shapes are often interpreted as continuity/wholeness; practically, circles are also most common in natural objects (shells, stones) and heirlooms (coins).
- 2) The half-sphere (coconut shell) brings together two parts of a “whole coconut” that has been split, so it can be interpreted as separation/release; at the same time, it is a shape that is easy to use as a ritual tool.
- 3) The composite shape of the coffin (trapezoid–square) shows functional reasoning, namely that the size of the coffin matches the proportions of the body (body-legs) so that the geometry here works as a technical solution born from experience.
- 4) The rectangles/blocks on the graves and other artifacts (Beti cloth, paper money) indicate the need for a stable space that is easy to work on collaboratively. Straight lines facilitate

the excavation and arrangement of coffins, while a depth of ± 1 meter marks a safe/practical standard according to local knowledge.

The concept of geometry in the burial of the deceased is seen as part of the community's craft knowledge since geometric shapes are the most practicable, functional, and culturally acceptable. This discovery is identical with broader ethnomathematics investigations, such as those conducted by Deda et al. (Deda, Disnawati, et al., 2024; Deda & Amsikan, 2019), which identify geometry as the most widely used mathematical domain inscribed in cultural artifacts due to its direct relationship to physical items and daily routines (Iffah et al., 2025).

In addition, there is a custom of 2 nights and 3 days of vigil, 3 funerals, and a 40-day memorial, which is a social algorithm. These are the steps that must be followed so that the death is considered to have been properly completed. This algorithm allows the family to carry out the mourning process and know when to keep vigil, when the peak ritual is performed, when the community returns to its normal rhythm of life, and when the memory of the deceased is marked again through a memorial. In crisis situations (such as a pandemic), when such an algorithm is disrupted, many families feel they have lost the mechanism for closing the mourning period, and this is evident in studies on mourning and funerals in Indonesia (Adu et al., 2023).

Another interesting finding is that silver coins, sacrificial animals, food distribution, and siri-pinang show that death rituals are also a mechanism for redistribution. There is an inflow (relatives/neighbors bring aid and offerings) and an outflow (distributed during the mourning process and after the funeral). The distribution of food and siri-pinang is a way for the people of East Noemuti to strengthen solidarity and maintain the dignity of the bereaved family. This means that social mathematics works through the principle of local justice, namely that grief is shared by family/relatives and social relationships are restored through the practice of giving and receiving.

These ethnomathematical concepts have great potential to be translated into meaningful mathematical learning contexts, such as the geometry of flat/spatial shapes from artifacts (circles, hemispheres, composites, rectangles, blocks), measurement and size comparison (coffin-grave dimensions), number patterns and work sequences (duration, repetition, warning schedules), and quantity and distribution (concepts of division, proportion, and simple data). These findings are not only descriptive but also applicable and recommended for implementation in mathematics education. This strengthens the argument that ethnomathematics contributes significantly to improving mathematical literacy and contextual understanding among students (Hartoyo et al., 2025).

Conclusion

Based on the description of the results and discussion of ethnomathematics in the traditional death rituals of the NoemutiTmur community in Haekto Village, obtained through interviews, observations, and documentation, it can be concluded that a number of geometric concepts were found in the ritual practices, namely circles, hemispheres, composite flat shapes, rectangles, straight lines, and blocks; circles are seen in coconut shells, silver coins, stones, and baskets; hemispheres are seen in coconut shells; composite flat shapes (a combination of trapezoids and quadrilaterals) appear in the shape of coffins; rectangles are found in the cemetery/burial template area and coins; straight lines are seen on the edges of graves; and blocks are seen in the shape of graves; These findings show that mathematical elements are present contextually in the local culture and can be used as material to strengthen learning as well as efforts to preserve death ritual traditions for future generations.

Recommendations

Based on the findings of this study, teachers are advised to utilize the context of traditional death rituals as a learning resource for applying contextual mathematics learning, while the community needs to continue to maintain and preserve the culture of traditional death rituals as a distinctive identity so that it remains sustainable and is not eroded by the passage of time. In addition, future researchers interested in studying traditional death rituals in Haekto Village, North Central Timor Regency, can use the results of this study as a basis for exploring more deeply mathematical concepts that also have the potential to be present in other rituals, such as birth and marriage in Haekto Village.

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