Indonesian Journal of Ethnomathematics
Volume 1, No. 1, April 2022, pp. 55-74
ISSN 2775-8001

Ethnomathematics in the Meto Tribe Tradition of Corn Binding

Malkisedek Taneo, Aleksius Madu

University of Nusa Cendana, Jl. Adi Sucipto Penfui, Penfui, Maulafa, Kota Kupang, Nusa Tenggara Timur 85001, Indonesia
E-mail: leksi_madu@staf.undana.ac.id

Abstract

The role of culture in a group of people cannot be separated from the evolving and interrelated mathematical concepts contained within the culture itself. But academic math learning in formal schools makes mathematics taught directly in abstract formulas and structures and away from the culture around students. The study aims to illustrate the ethnomathematics that exist in the tradition of binding corn in the Meto culture in South Central Timor regency. This study uses ethnographic methods. The process of extracting ethnomathematics in Meto culture is carried out through the process of literature studies, observations, and interviews with Tokog or members of the Meto tribe. The information obtained was then analyzed to describe the results of exploration of ethnomathematics in the tradition of binding corn in the Meto culture. The results of this study show that the Meto tribe has used and developed their own mathematics in the tradition of binding corn. Some of the mathematical concepts found in the tradition are the concept of counting numbers and the concept of geometry. The results of this study are expected to be used as a context in the learning of mathematics in schools around the Meto tribe. So that students can easily learn mathematics from their own culture that is close to their daily lives.

Keywords: Ethnomathematics, Binding Corn Tradition, Meto Tribe, Ethnography

Abstrak

Peran budaya dalam kelompok masyarakat tidak dapat dipisahkan dari konsep matematika yang berkembang dan saling terkait yang terkandung dalam budaya itu sendiri. Namun pembelajaran matematika akademik di sekolah formal membuat matematika diajarkan langsung pada rumus dan struktur yang abstrak serta jauh dari budaya yang ada disekitra siswa. Penelitian ini bertujuan untuk menggambarkan ethnomathematics yang ada di tradisi mengikat jagung dalam kebudayaan suku Meto di kabupaten Timor Tengah Selatan. Penelitian ini menggunakan metode etnografi. Proses penggalian ethnomathematics dalam kebudayaan suku Meto dilakukan melalui proses kajian literatur, observasi dan wawancara dengan tokog atau anggota suku Meto. Informasi yang diperoleh kemudian dianalisis untuk menggambarkan hasil eksplorasi ethnomathematics dalam tradisi mengikat jagung dalam kebudayaan suku Meto. Hasil penelitian ini menunjukkan bahwa suku Meto telah menggunakan dan mengembangkan matematika mereka sendiri dalam tradisi mengikat jagung. Adapun beberapa konsep matematika yang ditemukan dalam tradisi tersebut adalah konsep penghitungan angka dan konsep geometri. Hasil penelitian ini diharapkan dapat digunakan sebagaii konteks dalam pembelajaran matematika disekolah didaerah sekitar suku Meto. Sehingga siswa dapat dengan mudah mempelajari matematika dari kebudayaan mereka sendiri yang dekat dengan kehidupan sehari-hari merekaAbstrak dibuat dalam 2 bahasa, yaitu bahasa Indonesia dan bahasa inggris. Edisi bahasa Indonesia merupakan terjemahan dari abstrak dalam bahasa inggris dengan format sama seperti abstrak dalam bahasa inggris.

Kata kunci: Ethnomathematics, Tradisi Mengikat Jagung, Suku Meto, Etnografi

How to Cite: Taneo, M., & Madu, A. (2022). Ethnomathematics in the Meto Tribe Tradition of Corn Binding. *Indonesian Journal of Ethnomathematics, 1*(1), 55-74. http://doi.org/10.48135/ije.v1i1.55-74

Introduction

Culture or tradition is the basic knowledge gained from human processes in responding to phenomena and problems encountered in the reality of their lives (Koentjaradiningrat, 2009). This basic knowledge then develops, organized, and passed down through generations until it becomes a system of science. D'Ambrosio (1985; 2016) explains that every culture has used and developed mathematical ideas, ways, and techniques in its efforts to deal with phenomena and problems in the reality of their lives, or so-called ethnomathematics. Ethnomathematics can be seen as a study that examines the way a

particular group of cultures understand, express, and use cultural concepts and practices in relation to mathematics (Karnilah, 2013).

However, it is unfortunate that in academic mathematics in schools the concept of science developed from the efforts of a community group or a cultural group to respond to the reality of life is not inspired in learning even in the curriculum of academic mathematics education in school (Alangui, 2010; Rosa & Orey, 2016; Risdiyanti & Prahmana, 2020). As a result, teaching mathematics in schools directly teaches mathematics in the form of abstract formulas and structures, so that students have difficulty understanding and using them in dealing with problems encountered in the reality of students' daily lives (Muhtadi, Sukirwan, Warsito, & Prahmana, 2017; Rosa & Orey, 2016; Risdiyanti, Prahmana, & Shahrill, 2019).

The general understanding used in formal learning today is that learning is focused on learning in class and given finished subject matter, it certainly makes students' learning interest and learning motivation reduced (Prabawati, 2016; Arisetyawan, Suryadi, Herman, & Rahmat, 2014). The presence of ethnomathematics in math learning gives a breath of fresh air that learning mathematics is not only done in class but can be done outside the classroom in the form of adaptation to the surrounding culture. This is in line with the results of Prihastari (2015) which shows that culture-based learning in mathematics learning can be one of the innovations in eliminating the assumption that mathematics is rigid. Thus, through ethnomathematics-based learning makes math learning feel fun, able to bring students closer to their culture and able to increase students' interest and motivation in learning mathematics. Shirley and Palharez (2016) views that ethnomathematics are currently at the center of the learning process, unlocking pedagogical potential that considers the knowledge students gain from learning outside the classroom.

The problem of teaching mechanistic mathematics, directly in formulas and abstract structures almost occurs all over the world, including Indonesia, even today (Risdiyanti & Prahmana, 2020). Therefore, there needs to be an effort to restore mathematics rooted in the system of knowledge developed by humans in their cultural groups when dealing with phenomena and problems in the reality of their lives. This can be done by studying ethnomathematics on the culture around students, so that students can discover for themselves the mathematical science that exists in their own cultural knowledge system. Of course, this is much more interesting and more meaningful than just students just listening and memorizing abstract formulas and structures described by teachers in the classroom.

In Indonesia there are various cultures including in eastern Indonesia. One of the cultures in eastern Indonesia is the culture of binding corn in the meto tribal tradition. For children or students who live in the meto tribe this tradition of binding corn is very familiar in their lives, even a small band of this tradition already exists and is always done every season of corn harvesting. In the activity of binding corn, meto

people have used mathematical ideas, methods and techniques that have been used and developed since the days of the ancestors of the meto tribe. This is an opportunity for school mathematics learning around the meto tribe to be able to use the tradition of binding corn as a context in learning. So that students will be able to discover for themselves the concepts, formulas, and mathematical structures of their own culture. This can make it easier for students to understand mathematical concepts and make it easier for students to be able to take meaning and understand the usefulness of mathematical concepts that they find in dealing with phenomena and problems in the reality of their lives.

Previous research on the exploration of ethnomathematics about traditions in various tribes in Indonesia was immortalized by Nurjanah, Mardia, and Turmudi (2021) about ethnomathematics on marosok traditions in Minangkabau tribal culture; Sowanto and Mulyadin (2019) about ethnomathematics about the tradition of woven fabrics in mbojo tribal culture; Sutarto, Hastuti, and Supiyati (2021) about ethnomathematics on the weaving tradition in Sasak tribal culture; and others. This research plays a role in the increasingly significant application of ethnomathematics in the tradition of binding corn in the culture of the Meto tribal community, South Central Timor Regency. The results of this study are expected to contribute to complementing previous research on ethnomathematics studies on cultures in various tribes in Indonesia. In addition, this research is expected to contribute to the treasures of science, especially in the field of mathematics education and can be used as a reference for teachers in developing mathematics learning based on ethnomathematics.

Methods

This research is qualitative research with an exploratory descriptive method, using an ethnographic design, which raises the theme of culture and examines it for the use of science (Creswell, 2011) Thus the results of the researcher's reflection are expected to be useful for the development of mathematics learning. Explorative research is excavation research, digging to find and find out a symptom or event (concept or problem) by conducting an assessment of these symptoms (Gulo, 2000). While the approach used in this study is an ethnographic approach, namely an empirical and theoretical approach that aims to obtain an in-depth description and analysis of culture based on intensive fieldwork. This approach focuses on finding out how people organize their culture in their minds and then using that culture in life, that culture exists in the human mind. The task of the ethnographer is to discover and describe this organization of thought (Spradley, 2007), as a social action that can transform a richer education (Kaminski, 2004)

The ethnomathematical design adopts four elements consisting of general questions, initial answers, critical construction, and specific activities (Alangui, 2010) and is based on six universally

required dimensions of mathematical activity, such as counting, finding, measuring, designing, playing, and explaining. (Bishop, 1988). In connection with this study, the researchers tried to dig up information through the literature, observation and the interview process with several figures or members of the Meto Tribe community who knew information about the object to be excavated. This study aims to describe the results of the exploration of the ethnomathematical form of the Meto Tribe community in the form of mathematical concepts in various customs or traditions of the Meto tribe, more specifically in the tradition of ikat corn that still exists in South Central Timor Regency.

This research was conducted in May 2021. Broadly speaking, the research procedures to be carried out in this study are in accordance with research procedures that adopt an ethnographic approach including, f*irst,* determining Informants, good informants are informants who are directly involved and know well about the things to be studied. Informants selected in this study are people who are considered to be able to tell stories easily, and understand the information needed; *second,* conducting interviews with informants, there are several ethics that interviewers must adhere to, including considering the interests of informants first, conveying research objectives, protecting informants' privacy, and not exploiting informants; *third,* making ethnographic records, an ethnographic record includes field notes, image recording devices, artifacts and other objects that document the cultural setting being studied; *fourth,* asking descriptive questions, descriptive questions are questions that require an explanatory answer; *fifth,* conducting ethnographic interview analysis, the analysis of ethnographic interviews is to underline all the original terms of the informants that have been obtained to enhance their role in knowing about the cultural object under study.

This analysis is related to the symbols and meanings conveyed by the informants; *sixth,* making domain analysis, the researcher made the terms covering what the informants stated. The terms should have a clear semantic relationship; *seventh*, asking structural questions, structural questions are questions that are tailored to the informant. Structural questions aim to find out how informants organize their knowledge; *eighth*, conducting taxonomic analysis, taxonomic analysis focuses on certain domains that are very useful for describing the phenomenon or problem that is the target of research. Taxonomic analysis was carried out to make categories of cultural symbols in the culture under study; *nineth,* writing ethnography, the researcher then provides a narrative explanation of the essence of the findings being studied and gets the meaning of the informant's experience (Spradley, 2016).

Results and Discussion

Method Culture Calculation of Mnelalete Village

The Meto tribe is one of the tribes located in Mnelalete Village, West Amanuban District, South Central Timor Regency. The Meto Tribe in general could count since ancient times. This ability to count has become a tradition in any activity carried out by the Meto Tribe community. One application of this ability to count is in the tradition of tying corn. Table 1 will present numbers in the language of the Meto tribe.

Table 1. Number in Meto Tribe Language

Numbers	Meto Language	Numbers	Meto Language
0	Luman	51	Bonim ma mese
1	Mese	52	Bonim ma nua
2	Nua	53	Bonim ma teun
3	Teun	54	Bonim ma ha
4	Ha	55	Bonim ma nim
5	Nim	56	Bonim ma ne
6	Ne	57	Bonim ma hiut
7	Hiut	58	Bonim ma faun
8	Faun	59	Bonim ma sio
9	Sio	60	Bone
10	Boes	61	Bone ma mese
11	Boes ma mese	62	Bone ma nua
12	Boes ma nua	63	Bone ma teun
13	Boes ma teun	64	Bone ma ha
14	Boes ma ha	65	Bone ma nim
15	Boes ma nim	66	Bone ma ne
16	Boes ma ne	67	Bone ma hiut
17	Boes ma hiut	68	Bone ma faun
18	Boes ma faun	69	Bone ma sio
19	Boes ma sio	70	Bohiut
20	Bonua	71	Bohiut ma mese
21	Bonua ma mese	72	Bohiut ma nua
22	Bonua ma nua	73	Bohiut ma teun
23	Bonua ma teun	74	Bohiut ma ha
24	Bonua ma ha	75	Bohiut ma nim
25	Bonua ma nim	76	Bohiut ma ne
26	Bonua ma ne	77	Bohiut ma hiut
27	Bonua ma hiut	78	Bohiut ma faun
28	Bonua ma faun	79	Bohiut ma sio
29	Bonua ma sio	80	Bofaun
30	Boteun	81	Bofaun ma mese
31	Boteun ma mese	82	Bofaun ma nua
32	Boteun ma nua	83	Bofaun ma teun
33	Boteun ma teun	84	Bofaun ma ha
34	Boteun ma ha	85	Bofaun ma nim
35	Boteun ma nim	86	Bofaun ma ne
36	Boteun ma ne	87	Bofaun ma hiut

37	Boteun ma hiut	88	Bofaun ma faun
38	Boteun ma faun	89	Bofaun ma sio
39	Boteun ma sio	90	Bosio
40	Boha	91	Bosio ma mese
41	Boha ma mese	92	Bosio ma nua
42	Boha ma nua	93	Bosio ma teun
43	Boha ma teun	94	Bosio ma ha
44	Boha ma ha	95	Bosio ma nim
45	Boha ma nim	96	Bosio ma ne
46	Boha ma ne	97	Bosio ma hiut
47	Boha ma hiut	98	Bosio ma faun
48	Boha ma faun	99	Bosio ma sio
49	Boha ma sio	100	Natun mese (nautnes)
50	Bonim		

Based on Table 1, there are different designations in the names of numbers from 0 to 10, while 11 to 99 are formed from a combination of numbers 1 to number 9. For numbers 100 to infinity 60 tis also a combination of numbers 1 to 9. In the language of the Meto tribe, *ma* means 'add or plus' *poi* means 'less or minus', tens are called *bo*, hundreds are called *naun* thousands are called *nifun* for millions and so on have no special designation. For a more detailed explanation, see the Table 2.

Table 2. Number Construction in Meto Tribe Language

Numbers	Numbers in Meto Language	Construction of Numbers
10	Bomese	10
11	Boes ma mese	10+1
12	Boes ma nua	10+2
13	Boes ma teun	10+3
14	Boes ma ha	10+4
15	Boes ma nim	10+5
16	Boes ma ne	10+6
17	Boes ma hiut	10+7
18	Boes ma faun	10+8
19	Boes ma sio	10+9
20	Bonua	10 + 10
30	Boteun	10+10+10
40	Boha	10+10+10+10
50	Bonim	10+10+10+10+10
60	Bone	10+10+10+10+10+10
70	Bohiut	10+10+10+10+10+10+10
80	Bofaun	10+10+10+10+10+10+10+10
90	Bosio	10+10+10+10+10+10+10+10+10
91	Bosio ma mese	90+1
92	Bosio ma nua	90+2
93	Bosio ma teun	90+3
94	Bosio ma ha	90+4
95	Bosio ma nim	90+5

96	Bosio ma ne	90+6
97	Bosio ma hiut	90+7
98	Bosio ma faun	90+8
99	Bosio ma sio	90+9

Based on Table 2, the number 11 is called *boes ma mese* which means ten plus one and is constructed as 10 + 1. In the number 12 it is called *boes ma nua* which means ten plus two and is constructed as 10 + 2. And so on until 20. In the number 20 is called *bonua*, meaning that there are two tens or ten plus ten and it is construed as 10 + 10. For the number 21 it is called *bonua ma mese*, meaning ten plus ten plus one and is converted as 10+10+1. And so on for the next number. From table 1 and table 2 above, it is found that the Meto tribe community in Mnelalete Village counts using the base 10 number system (decimal system).

The Tradition of Corn Tying in Meto Tribe, Mnelalete Village

The agricultural sector, especially maize, has enormous potential to be developed. Apart from being a food ingredient, corn can also be used as an industrial raw material for animal feed, food, pharmaceuticals, dextrin, and bioethanol. East Nusa Tenggara (NTT) is one of the corn producing regions in Indonesia, even NTT was declared a corn province (Nawantuti, 2012, in Levis 2016). Although corn has been cultivated for a long time and has become an important part of the economic structure of the NTT community, many farmers still use the traditional way of cultivating corn.

The Meto Tribe is one of the tribes located in Mnelalete Village, West Amanuban District, South Central Timor Regency. The Meto Tribe people generally have a livelihood as farmers. As farmers, the Meto tribe of Mnelalete Village has a tradition when the corn harvest is over. This tradition has been passed down from generation to generation to this day. The tradition in question is the tradition of tying corn, or in the language of the Meto Tribe it is called *Tbu Pena*. This tradition is carried out after the community finishes the corn harvest in *lene/poan* which means garden/field. Corn that is harvested is collected at the hut; some is collected at the house. Some of these corns are arranged and some are not. Which is arranged can usually form a tube. This pile of corn is commonly called *nabuata* which means collection, presented in Figure 1.

Figure 1. Pile of Corn after harvest

After the corn has been harvested and stored in the house or cottage, the next step is the owner of the house or in the language of the Meto Tribe called *uim uaf* inviting neighbors to tie the corn. Of course, in this process there are rituals performed. This ritual is in the form of praying together, this ritual is a sign of the start of the corn tying process. The preparations made by the owner of the corn include, betel (*manus*), areca nut (*puah*), food and drinks (*mnahat ma mninut*), knives and sharpening stones (*besi ma aki*), shown in Figure 2.

Figure 2. People who tie corn will sit around a pile of corn

After completing this traditional process of tying corn, the next step is to tie the corn. During the process of tying corn, everyone who comes sits in a circle (forms a circle) around the pile of corn to be tied. This circular sitting in the Meto language is called *nabonet*, it means togetherness, has a sense of brotherhood and family and cooperation. Corn that will be tied is taken *pune mese* which means 1 grain. One single ear contains the meaning of a man or woman who is still single (does not have a wife/husband). There are also those who take 2 grains in the meto language called *pune nua* and some are taken 4

grains in the meto language called *pune ha*. Taking corn to be tied depends on the size of each ear of corn. If the size is large then take 1 or 2 grains, if the size is small then take 2 grains.

One ear symbolizes a single human being which means "a man or woman who is not married or has a family", two ears symbolize family life which means 'husband and wife', four ears symbolize a family consisting of "father, mother and child", as shown in Figure 3.

Figure 3. Corn to be tied and combined into one knot

After completing this traditional process of tying corn, the next step is to tie the corn. During the process of tying corn, everyone who comes sits in a circle (forms a circle) around the pile of corn to be tied. This circular sitting in the Meto language is called nabonet, it means togetherness, has a sense of brotherhood and family and cooperation. Corn that will be tied is taken pune mese which means 1 grain. One single ear contains the meaning of a man or woman who is still single (does not have a wife/husband). There are also those who take 2 grains in the meto language called pune nua and some are taken 4 grains in the meto language called pune ha. Taking corn to be tied depends on the size of each ear of corn. If the size is large then take 1 or 2 grains, if the size is small then take 2 grains.

One ear symbolizes a single human being which means "a man or woman who is not married or has a family", two ears symbolize family life which means 'husband and wife', four ears symbolize a family consisting of "father, mother and child ", presented in Figure 4.

Figure 4. Corn Tying technique

The way to tie corn from the picture on the left is a corn tie with the corn head bent, this implies the bonding of a man in the meto language better known as *mukniu*, while the picture on the right is a way to tie the corn head up which means to tie the corn up. The bond of a woman in the Meto language is better known as *mbua*.

Corn with a large size is usually called a *pena naek* which symbolizes the king or leader (corn king). This corn will be placed in the middle position in the pile of corn that is stored after being tied. The small corn is called the *pena ana* symbolizing the people and is placed around the large corn in a pile of corn after being tied. Large-sized corn is usually taken when small-sized corn is no longer available or consumed. Usually, this large corn is taken for seedlings in the next growing season.

Corn tied from one ear combined into 2 ears and two into 4 ears, 4 ears combined into 8 ears. These 8 grains are called a bunch or in the Meto language called *futu mese*. The concept of numbers used in this calculation is a number to the power of. However, in a cultural context, 4 ears symbolize the cardinal directions (north, east, west, south) 8 ears symbolize husband and wife and family clumps. These 8 ears of corn are called *futu mese* (1 bunch). *futu Bonua* (20 bundles) will form 1 horse or equal to 160 ears (*nautnes ma bone*). *Bikase boes* (10 horses) is equal to 1 tuke, 100 horses are equal to 10 tukes or equal to 1 lian or 16,000 ears of Corn. The symbol of "Horse", it is said that the Meto people use horses as a means of transportation to carry corn from the garden (agricultural land) to their home, presented in Figure 5.

Figure 5. Bunch of corn (1/2 Horse = 80 ears = 10 Bunches)

This calculation is specifically for small-sized corn (corn which symbolizes the people). As for the large corn which symbolizes the King or leader, the calculation is different, namely 1 *Haneka* is equal to 20 ears. These 20 grains become one bunch (Figure 6). This calculation uses base 10 numbers.

Figure 6. Corn Tying (1 *Haneka* = 20 grains)

Furthermore, after the corn is tied, the corn is placed on the attic or *pana tunan* to be dried by smoking technique. Corn is arranged to form a cone, and the position of large corn will be stacked in the middle by tying a rope. The rope will penetrate the pile of corn. The rope is a bond that connects humans with the creator. The process of preparing corn in the attic is carried out by women, this symbolizes fertility, so that the next process will run safely, peacefully, and prosperously for the family who enjoys the harvest. After the corn is placed in the attic, the next step is to carry out the closing ritual in the form of praying together.

Ethnomathematics in Integration of Meto Corn Culture in Math Learning

Based on the previous description of the ethnomathematical exploration of the corn-binding culture in the Meto Tribe, Mnelalete Village, West Amanuban District, South Central Timor Regency, it was found that the mathematical concepts contained in the Corn grain culture were found. The linkage of mathematical concepts and culture of corn binding can be linked in learning mathematics at school. The following describes the mathematical concepts contained in the corn tie culture.

a. Counting Activities

In counting activities, the counting activities carried out are related to counting the number of ears of corn used to produce one bunch, *one futu*, *one haneka*, *one horse*, *one lian*, counting in the process of *futu pena* (corn bundle).

Table 3. Number of Corns within One Bunch

Type of Tying	Name	Amount Number	Form of Addition	Multiplication	Result
Big Size Corn (King/Leader)	*Haneka*	20	1+1+1+1+1+1+1+1+1+ 1+1+1+1+1+1+1+1+1+ 1+1+1+1+1+1+1+1	20 x 1	20
Small Size Corn (People)	*Futu*	8	1+1+1+1+1 +1+1+1+1	8 x 1	8

Table 3 can help students to understand the concept of multiplication 1 as a form of repeated addition. Thus, this mathematical concept can be applied in learning mathematics at school. Furthermore, the conversion of numbers in this counting process can be seen in Table 4.

Table 4. Counting Conversion in Meto Corn Tie Culture

Type of Tying	Name	Amount Number	Form of Addition	Multiplication	Result
Big Size Corn (King/Leader); and Small Size Corn (People)	*Kuda*	160	10 + 10 +10 +10 +10 +10 +10+10 +10 +10 +10 +10 +10+10+10+10	16 x 10 = 2^4 x 10	160
	Tuke	1.600	100+100+100 +100 +100 +100 + 100 + 100 + 100 +100 + 100 + 100 + 100 +100 +100 +100	2^4 x 10^2	1.600
	Lian	16.000	1000+1000+1000+1000 +1000+1000+1000 +1000 +1000 +1000 +1000 + 1000 +1000 +1000+1000+1000	2^4 x 10^3	16.000

Table 4 can help students to understand the concept of multiplication with base 2 and base 10 as a form of repeated addition. Thus, this mathematical concept can be applied in learning mathematics at school.

b. Corn Binding Activities

Figure 7. Pile of corn (before tied) forming a tube

A pile of corn or a pen in the form of a rectangular shape, the concept of volume for how many ears of corn are arranged will be known by using the concept of finding the volume of the tube, presented in Figure 7.

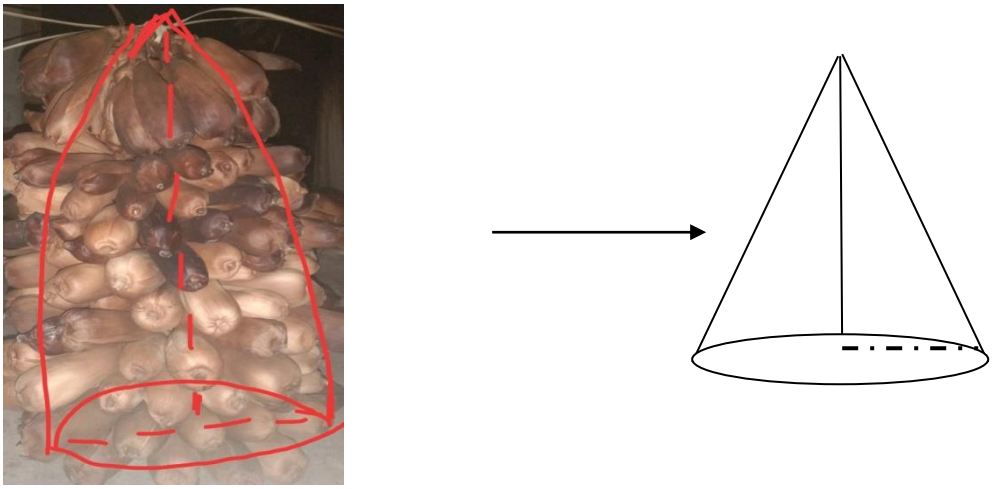

Figure 8. Heap of corn (after curling) forms a cone

Piles of corn or pens after being tied are stored in the attic (corn storage area) in the form of a space, the volume concept of how many bunches of corn is arranged will be known by using the concept of finding the volume of the cone, as shown in Figure 8.

c. The Sitting Position of the Person Tying the Corn

Figure 9. The position of people sitting around a pile of corn will form a circle.

Thus, it is concluded that the geometric concept contained in the Meto Tribe's ikat tradition can make it easier for students to understand the geometric concept by connecting the concept with concrete objects and conditions in the corn ika tradition (Figure 9). The mathematical concepts found in the tradition of tying corn of the Meto tribe of Mnelalete Village are presented in Table 5.

Table 5. The Meto Tribe Corn Tie Tradition in accordance with the Mathematical concept

No	The Meto Tribe Corn Tie Tradition	School Math concept
1	Counting the number of large corn (King/Leader) and small corn (People)	Operations Addition and Multiplication of Numbers and comparisons
2	Corn binding activity	Geometry (Tube, Cone and Circle)

In the tradition of tying corn, the Meto Tribe, Mnelalate Village, West Amanuban District, South Central Timor Regency, we found mathematical concepts that can be used in learning mathematics in schools according to the level of education.

Culture is a way of life that develops and is shared by a group of people and is passed down from generation to generation. According to anthropology, culture is the whole system of ideas, actions, and the results of human work in the context of community life which are made into human beings by learning. Culture is a pattern of behavior that is expressed through the symbols of society itself. The results of this study indicate that the Meto Tribe since ancient times have known mathematical concepts related to the concept of counting or counting, the concept of geometry and other concepts in mathematics. This model of understanding the concept of knowledge is better known as ethnomathematics. Rosa and Orey (2010) argue that the ethnomathematical model is the study of mathematical ideas and procedures elaborated by members of different cultural groups. It involves the practice of mathematics being developed, used, and presented in a variety of situations in everyday life by members of these groups.

From the research findings, there are several mathematical concepts contained in the Meto Tribe's maize tradition, including the concept of counting or counting here involving addition and subtraction operations as well as geometric concepts, namely the determination of the volume of the shape (the volume of the cylinder) and the area of the flat figure (circle). It is very clear that as a learner, it is very suitable if learning at school is based on a real context, where children are faced with real objects that can be seen, held, touched, and can be directly involved in real activities.

The context is holistic and enables those involved in this process to study mathematics as a system drawn from their own reality where there is a common effort to create an understanding of all the components of this system as well as the interrelationships between them (D'Ambrosio, 1993; Bassanezi, 2002; Rosa & Orey, 2003). The implementation of learning that is adapted to local traditions or wisdom allows students to understand the mathematical concepts given by the teacher. UU no. 32 of 2009, defines local wisdom as noble values that apply in the life of the community to protect and manage the environment in a sustainable manner. In foreign languages it is often referred to as local policy, local wisdom, local knowledge, local genius, or local intelligence (Fajarini, 2014). Furthermore, Matang (2002) argues that the purpose of ethnomathematical learning is to complement the efforts of teachers and students in formal school mathematics learning by providing relevant contextual meanings, considering the many abstract mathematical ideas with ethnomathematics there will be no more difficulties for students to learn and understand them.

Many people do not realize in everyday life that many mathematical concepts are used and applied. Basically, mathematics is a basic science with rapidly growing material and implementation (Arnidha, 2018). In connection with that, Munawaroh, (2017) mentions that one of the educational stimuli to convey academic, religious values and religious norms, as well as habituation of good behavior, is a fun activity. Education related to local culture or traditions must be associated with early learning mathematics in basic education. Cultural values can affect education in general and mathematics education (Fouze & Amit, 2017).

Studies on ethnomathematics provide strong evidence of interaction patterns between mathematics and mathematics education that do not completely overlap when communication is formed using mathematical modeling (Burkhardt, 2006) to anticipate conceptual ambiguity (Lesh et al., 2010). Ethnomathematics gives very good expectations and plays a role in didactic situations in creating and applying and shaping knowledge tools in mathematics learning by prioritizing cultural aspects. Ethnomathematics as an approach act as an alternative to solving problems and understanding mathematical systems (Rosa & Orey, 2016) and helping students understand the important role of mathematics in society (de Loiola Araújo, 2010).

Ethnomathematical research, using a culture-based approach, can produce more complete learning outcomes and not just explore mathematical forms based on cultural aspects. Ethnomathematics can continue and improve the performance of ethnomathematical researchers, especially in cultural aspects related to aspects of mathematical concepts. Be an example in raising the school's mathematical model based on cultural aspects. This is closely related to the modeling of learning to achieve mathematical construction knowledge (Ikeda, 2013). It is based on the capacity to model and find solutions to situations that can serve individuals in everyday life (Cai et al., 2014) to build new knowledge or reconstruct the knowledge they have acquired (Heuvel-Panhuizen, 2003). This ethnomathematical concept is very well applied in schools. This concept needs to be developed and applied since it provides opportunities for learners to give their best taking into consideration their interests, abilities, and learning styles (Ismaiji & Imami, 2018).

Thus, in the tradition of tying corn, the Meto Tribe, Mnelalate Village, West Amanuban District, South Central Timor Regency, we found mathematical concepts that can be used in learning mathematics in schools according to the level of education. The output of this research is in the form of a learning device that integrates ethnomathematics in the implementation of classroom learning related to learning materials for numbers and geometry. The implementation of this research output is very useful for teachers in carrying out learning. Where the teacher, as the executor of learning in the classroom, can use an ethnomathematical approach in learning mathematics, so that students are more familiar with mathematics with the local culture or traditions around them. In addition, students can understand about cultural values that need to be preserved and teachers can use their environment as a place to learn to instill learning concepts to students

Conclusion

The results of this study found a variety of mathematical knowledge contained in culture or corn ties in the Meto Tribe, Mnelalete Village, West Amanuban District, South Central Timor Regency. These findings have been identified and analyzed using ethnomathematical characteristics, which are then linked to school mathematics concepts that can be used in learning. Thus, the culture or tradition of tying corn in the Meto Tribe can be used in learning mathematics as a reference and new innovation in the practice of learning mathematics in schools. Mathematical concepts contained in the tradition or culture of corn ties, namely, the concept of numbers which include addition and multiplication, the concept of geometry which includes the area of a circle and the volume of a cylinder. From the results of ethnomathematical exploration obtained in the culture or tradition of tying corn, ethnomathematics-based mathematics learning can be carried out. Thus, it can be concluded that in the culture or tradition of ikat corn there are

school mathematical concepts which can then be developed in designing ethnomathematical-based mathematics learning in the classroom.

Acknowledgments

Thank you to the leadership of the university and the Institute for Research and Community Service at the University of Nusa Cendana who have given us the opportunity to carry out this research as well as to the Meto people who have participated in providing information to researchers.

References

Alangui, W. V. (2010). Stone walls and water flows: Interrogating cultural practice and mathematics. Doctoral Dissertation. Auckland: University of Auckland.

Arisetyawan, A., Suryadi, D., Herman, T., Rahmat, C., & No, J. D. S. (2014). Study of Ethnomathematics: A lesson from the Baduy Culture. *International Journal of Education and Research*. Citeseer. Retrieved from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.1046.6613&rep=rep1&type=pdf

Arnidha, Y. (2018). Analisis Pemahaman Konsep Matematika Siswa Sekolah Dasar Dalam Penyelesaian Bangun Datar. *JPGMI*, *3*(1), 53–61. https://ojs.stitmultazam.ac.id/index.php/JPGMI/article/view/22.

Bassanezi, R. C. (2002). Ensino-aprendizagem com modelagem matemática [Teaching and learning with mathematical modeling]. São Paulo, SP: Editora Contexto.

Bishop, A. J. (1988). Mathematics education in its cultural context. Educational Studies in Mathematics, 19(2), 179-191. https://doi.org/10.1007/BF00751231

Cai, J., Cirillo, M., Pelesko, J. A., Borromeo Ferri, R., Borba, M., Geiger, V., Stillman, G., English, L. D., Wake, G., Kaiser, G., & Kwon, O. N. (2014). Mathematical modeling in school education: Mathematical, cognitive, curricular, instructional and teacher education perspectives. In *Proceedings of the 38th Meeting of the International Group for the Pyschology of Mathematics Education* (pp. 145–172).

Creswell, John W. (2011). *Educational Rresearch:Planing, Conducting, and Evaluating Quantitative and Qualitative Research.* Boston: Pearson.

D'Ambrosio, U. (1993). *Etnomatemática: Um programa* [Ethomathematics: A program]. *A Educação Matemática em Revista, 1*(1), 5–11.

D'Ambrosio, U. (2016). An overview of the history of Ethnomathematics. In M. Rosa, U. D'Ambrosio, D. C. Orey, L. Shirley, W. V. Alangui, P. Palhares, & M. E. Gavarrete (Ed.). Current and Future Perspectives of Ethnomathematics as A Program (pp. 5- 10). Cham: Springer. https://doi.org/10.1007/978-3-319-30120-4_2

D'Ambrosio, U. (1985). Ethnomathematics and its place in the history and pedagogy of mathematics. For the learning of Mathematics, 5(1), 44-48.

de Loiola Araújo, J. (2010). Brazilian research on modelling in mathematics education. ZDM, 42(3-4), 337-348. https://doi.org/10.1007/s11858-010- 0238-9

Fajarini, U. (2014). Peranan kearifan lokal dalam pendidikan karakter. *Sosio-Ddidaktika: Social Science Education Journal*, *1*(2), 123–130. https://doi.org/10.15408/sd.v1i2.1225

Fouze, A. Q., & Amit, M. (2017). On the importance of an ethnomathematical curriculum in mathematics education. EURASIA Journal of Mathematics, Science and Technology Education, 14(2), 561-567. https://doi.org/10.12973/ejmste/76956

Gulo, W. (2000). Metodologi Penelitian. Jakarta: Grasindo.

Heuvel-Panhuizen, M. V. D. (2003). The didactical use of models in realistic mathematics education: An example from a longitudinal trajectory on percentage. *Educational Studies in Mathematics*, *54*(1), 9–35. Retrieved from http://link.springer.com/article/10.1023/B:EDUC.0000005212.03219.dc

Ikeda, T. (2013). Pedagogical reflections on the role of modelling in mathematics instruction. In Teaching Mathematical Modelling: Connecting to Research and Practice (pp. 255-275). Springer. https://doi.org/10.1007/978-94-007-6540-5_22

Ismajli, H., & Imami-Morina, I. (2018). Differentiated instruction: Understanding and applying interactive strategies to meet the needs of all the students. International Journal of Instruction, 11(3), 207-218. https://doi.org/10.12973/iji.2018.11315a.

Kaminski, E. (2004). Turning Points in Qualitative Research: Tying Knots in a Handkerchief. *Contemporary Sociology: A Journal of Reviews*, *33*(6), 738–739. https://doi.org/10.1177/009430610403300669

Karnilah, N. (2013). Study Ethnomathematics : Pengungkapan Sistem Bilangan Masyarakat Adat Baduy. *Universitas Pendidikan Indonesia, Bandung.*, *44*(8), 821–822. https://respository.upi.edu/id/exprint/385

Koentjaraningrat. (2009*). Pengantar Ilmu Antropologi*. Jakarta: Rineka Cipta.

Lesh, R., Galbraith, P. L., Haines, C. R., & Hurford, A. (2010). *Modeling students' mathematical modeling competencies: ICTMA 13*. *Modeling Students' Mathematical Modeling Competencies: ICTMA 13* (pp. 1–651). Springer US. https://doi.org/10.1007/978-1-4419-0561-1

Matang, R. (2002). The role of ethnomathematics in mathematics education in Papua New Guinea: Implications for mathematics curriculum. *Journal of Educational Studies*, 24(1), 27-37.

Muhtadi, D., Sukirwan, S., Warsito, W., & Prahmana, R. C. I. (2017). Sundanese Ethnomathematics: mathematical activities in estimating, measuring, and making patterns. Journal on Mathematics Education, 8(2), 185-198. https://doi.org/10.22342/jme.8.2.4055.185-198

Munawaroh, H. (2017). Pengembangan Model Pembelajaran dengan Permainan Tradisional Engklek Sebagai Sarana Stimulasi Perkembangan Anak Usia Dini. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, *1*(2), 86. https://doi.org/10.31004/obsesi.v1i2.19

Nurjanah, N., Mardia, I., & Turmudi, T. (2021). Ethnomathematics study of Minangkabau tribe: formulation of mathematical representation in the Marosok traditional trading. *Ethnography and Education*, *16*(4), 437–456. https://doi.org/10.1080/17457823.2021.1952636

Prabawati, M. N. (2016). Etnomatematika Masyarakat Pengrajin Anyaman Rajapolah Kabupaten Tasikmalaya. *Infinity Journal*, *5*(1), 25. https://doi.org/10.22460/infinity.v5i1.p25-31

Prihastari, E. B. (2015). Pemanfaatan Etnomatematika Melalui Permainan Engklek Sebagai Sumber Belajar. *Jurnal Kajian Pendidikan Dan Pengajaran*, *1*(2), 155–162. Retrieved from http://jm.ejournal.id/index.php/mendidik/article/view/23/13

Risdiyanti, I., & Prahmana, R. C. I. (2020a). Ethnomathematics (Teori dan Implementasinya: Suatu Pengantar). Yogyakarta: UAD Press.

Risdiyanti, I., Prahmana, R. C. I., & Shahrill, M. (2019). The learning trajectory of social arithmetic using an Indonesian traditional game. Elementary Education Online, 18(4), 2094–2108. https://doi.org/10.17051/ilkonline.2019.639439

Rosa, M., & Orey, D. C. (2003). Vinho e queijo: etnomatemática e modelagem!. *Bolema-Boletim de Educação Matemática*, 16(20), 1-16.

Rosa, M., & Orey, D. C. (2010). Ethnomodeling as a pedagogical tool for the ethnomathematics program. *Revista Latinoamericana de Etnomatemática Perspectivas Socioculturales de la Educación Matemática* 3(2),14–23.

Rosa, M., & Orey, D. C. (2016). State of the art in Ethnomathematics. In M. Rosa, U. D'Ambrosio, D. C. Orey, L. Shirley, W. V. Alangui, P. Palhares, & M. E. Gavarrete (Ed.). Current and Future Perspectives of Ethnomathematics as A Program (pp. 11- 37). Cham: Springer. https://doi.org/10.1007/978-3-319-30120-4_3

Shirley, L., & Palhares, P. (2016). Ethnomathematics and its Diverse Pedagogical Approaches. In *Current and Future Perspectives of Ethnomathematics as a Program* (pp. 13–17). Springer.

Sowanto, & Mulyadin, E. (2019). Developing of teaching materials for junior high school students based on ethnomathematics on traditional woven cloth (Tembe Nggoli) of Mbojo tribe. In *Journal of Physics: Conference Series* (Vol. 1280). Institute of Physics Publishing. https://doi.org/10.1088/1742-6596/1280/4/042044

Spradley. J. P. (2007). Metode Etnografi. Yogyakarta: Tiara Wacana.

Sutarto, S., Hastuti, I. D., & Supiyati, S. (2021). Etnomatematika: Eksplorasi Transformasi Geometri Tenun Suku Sasak Sukarara. *Jurnal Elemen*, *7*(2), 324–335. https://doi.org/10.29408/jel.v7i2.3251