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# Ethnomathematics: Numerical Literacy in the Dawan Language System Dialects of the Amanuban Tribe and its Relation to Mathematics Learning

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**Abstract.**
This research aims to describe the numerical literacy in the Dawan language system, the dialect of the Amanuban tribe, South Central Timor Regency in terms of ethnomathematics perspective and its relation to mathematics learning. This research is qualitative with an ethnographic research type. Data collection techniques were done through observation, interviews, and literature study. The results of this research indicate that the numerical literacy in the Dawan language system, the Amanuban dialect used by the community when using the number system is very unique. The uniqueness is that the community uses the base 10 number system with the unit base number 0 to 9 and the tens base number 10, which is used to calculate the next number using the concept of multiplication and addition. The mention of the name of the day in the Dawan language of the Amanuban dialect is also based on the unit base number system. This uniqueness can be used as a reference in learning mathematics with numbers, especially the concept of number sequences, the place value of a number, and addition and multiplication operations on integers for low-grade students who are fluent in Dawan.

**Keywords:** dawan language system dialects of the amanuban tribe, ethnomathematics, mathematics learning, numerical literacy.

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## 1. INTRODUCTION

The role of mathematics functionally in the context of everyday life which refers to the ability of individuals to respond to needs and constraints in society is known as the conception of mathematical literacy [1]. Sfard noted that mathematical literacy lies between everyday life and mathematics which promotes thinking as a form of communication consisting of asking questions, hypothesizing, finding arguments, and drawing conclusions in a situation [2]. Application and practical context is a virtue in mathematical literacy although it may tend to limit the space contained in mathematics

itself. Mathematics is knowledge from a culture that grows and develops to connect human needs [3]. Practically it has become a general view that mathematics is always related to the practical problems of calculating and recording numbers [4].

A review of human development, especially in the fields of science, shows that mathematics is involved in many human efforts to acquire knowledge [5]. Meanwhile, the values of mathematics are related to the nature of mathematics which is derived from how mathematicians of different cultures develop mathematics [6]. Both of these views conclude that mathematics and culture are integrated parts. The relationship between cultural anthropology, mathematics, and the use of mathematical modeling is referred to as ethnomathematics [7].

Ethnomathematics as a pathway for mathematics education research has a role in studying mathematical ideas from cultural roots given by an ethnic, social, and professional group. Ethnomathematics studies seek to follow anthropological studies and try to identify mathematical problems starting from other knowledge within form and rationale [8]. Since centuries ago mathematics was believed and interpreted as a universal concept. The universality of mathematics can be interpreted as a unified concept that applies equally and consistently in any hemisphere. The fact that mathematics is found all over the world, in various places, and at different times with little or no contact between its creators strengthens the notion of the universality of mathematics [9].

This belief arises because several theorems and arguments in mathematics can be generalized so that they are universally applicable by leaving aside ethnological boundaries even though the generalizations are restrictive. This fact cannot be denied on the one hand, for example for symbols, notations, logic, principles, theorems, assumptions, and others that are agreed upon and generally accepted. This results in a person trapped into a formal process with strict and rigid rules in studying mathematics [10]. Beliefs about the universality of mathematics are well-founded. This belief is evident in the fact that basic concepts and premises are identical which are found all over the world [11]. Concerning the belief about the universality of mathematics as an antithesis, anthropologists have shown various evidence of the typical mathematical activities carried out by society, such: counting, sorting, measuring, weighing, and sorting are carried out in ways that are very different from the material taught in schools [8].

Numerical literacy is one of the important literacies that must be mastered. This is because numeracy literacy is related to making the right decisions based on mathematical data in the form of numbers, data, and symbols that exist in everyday life. Numerical literacy is the knowledge and skills to use various numbers and symbols related to basic mathematics to solve practical problems in various contexts of everyday life and

analyze information presented in various forms (graphs, tables, charts, etc.) then use the interpretation of the results of the analysis to predict and make decisions [12]. Numerical literacy is an important ability in using reasoning to analyze and understand a statement, through activities in manipulating mathematical symbols or language found in everyday life.

Research on numeration in culture aims to identify the types of numeration, how to count, how to symbolize, and how to operate it [13]. This is because each culture is unique and is not always the same as school mathematics in general. In general, the study of numerical literacy is related to the culture of a society which is specifically studied in ethnomathematics-based research. There are several previous studies discussing numeration in Indonesian culture by Hendrawati et al[14], Papua New Guinea culture by Owens and Lean. [15], Owens [16], Matang, Rex and Owens [17] Australian culture by Parnis and Petocz [18], and African culture by Paulus Gerdes [19]. Based on the results of the research conducted, Indonesia is a country with a multicultural population with very abundant cultural diversity, especially in the system of using different numerical languages in each region. Practically and empirically, these studies can reveal practices in the form of ethnomathematics that are different from one another both in one group and in different groups of people including the Amanuban tribe community in South Central Timor (TTS) regency.

One culture that is still closely related to the Amanuban ethnic community is the use of the Dawan language as everyday language, especially in the mention of unique numbers. Dawan is the language spoken in almost all of mainland Timor or *pah meto* (dry land). The Dawan language is often called *uab meto* by the speaking community. The Dawan-speaking community is known as *atoin meto*. The word *atoin* comes from the root word *atoni* which means “men”, “people”, and “humans”, while *meto* means “dry”, then *atoin meto* can be interpreted as people from dry (mainland) land [20]. Tarno stated that speakers of the Dawan language are spread across almost all parts of the island of Timor. However, the Dawan dialect in some areas is different from other regions. The Dawan language has ten dialects, namely Molo, Amanatun, Amanuban, Amarasi, Amfoang, Biboki, Miomafo, Manlea, Kupang and, Manulai [21]. The Dawan language used by the people of South-Central Timor regency has three dialects that are used in both formal and non-formal communication. The three dialects are the Molo, Amanuban, and Amanatun dialects. The Dawan language of the Amanuban dialect is spoken in the Amanuban region which includes West Amanuban, South Amanuban, Central Amanuban, East Amanuban, and several surrounding areas [20].

Research related to the Dawan language in the Amanuban dialect conducted by Hajar and Purniawati [20] concluded that the Dawan language has class languages, expressions, or idioms with a very wide variety of meanings. In the mention of numbers and days in the Dawan language, the Amanuban dialect uses the unit number system, namely *mese, nua, tenu, ha, nima, ne, hitu, fanu and, sio.* This research aims to describe numerical literacy in the Dawan language system, the dialect of the Amanuban tribe, South Central Timor Regency in terms of ethnomathematics perspective and its relation to mathematics learning.

## 2. RESEARCH METHOD

This type of research was qualitative research with ethnographic methods. Ethnographic research is a study of cultural patterns and perspectives in their natural setting [22]. The purpose of ethnographic research is to describe a culture, whether it is abstract, such as experience, belief, norm system, and so on, or materials such as cultural artifacts (tools, buildings, clothes, etc.) [23]. In line with these ethnographic objectives, this study aims to describe numerical literacy in the Dawan language system, the Amanuban dialect, South Central Timor regency, and its relation to mathematics learning. The research design refers to the ethnographic study design by Alangui which is based on 4 basic questions: (1) where is it to look? (2) how is it to look? (3) what is it? (4) what does it mean? [24]. Data collection in research so far was obtained using observation, interviews, and literature studies. The data that has been obtained was then validated using the method triangulation technique. After all, data is obtained from data sources, then the research data is ready to be processed, the analysis this study includes four main things, namely data collection through observation, interviews with sources and documentation, data reduction where the researcher summarizes all the results of interviews and documentation and determining the outline, the presentation of the data, namely presenting the summary results and concluding, namely that the researcher makes a conclusion based on the data that has been summarized.

## 3. RESULT AND DISCUSSION

The Dawan language in the Amanuban dialect has ten base numbers which are used to calculate the next number as shown in Table 1.

The mention of the number ten is *bo mese* where *bo* means ten or *puluh* in Indonesian and *mese* means one. The mention of the number eleven is *bo mese am mese* with

TABLE 1: The basic number and the number of the dozens.

| Number | Dawan Languange (Amanuban's Dialect) | Indonesian | Number | Dawan Languange (Amanuban's Dialect) | Indonesian |
|---|---|---|---|---|---|
| 0 | Nol | Nol | 10 | Bo Mese (Bo'es) | Satu Puluh (Sepuluh) |
| 1 | Mese | Satu | 11 | Bo Mese am Mese | Sebelas |
| 2 | Nua | Dua | 12 | Bo Mese am Nua | Dua Belas |
| 3 | Tenu | Tiga | 13 | Bo Mese am Tenu | Tiga Belas |
| 4 | Ha | Empat | 14 | Bo Mese am Ha | Empat Belas |
| 5 | Nima | Lima | 15 | Bo Mese am Nima | Lima Belas |
| 6 | Ne | Enam | 16 | Bo Mese am Ne | Enam Belas |
| 7 | Hitu | Tujuh | 17 | Bo Mese am Hitu | Tujuh Belas |
| 8 | Fanu | Delapan | 18 | Bo Mese am Fanu | Delapan Belas |
| 9 | Sio | Sembilan | 19 | Bo Mese am Sio | Sembilan Belas |

the word *bo mese* which means ten as the base number of tens followed by the base number of units, namely *mese* or one and so on for other numbers. The mention of the numbers tens to millions uses the numerical values of *Bo* (tens), *Natun* (hundreds), *Nifun* (Thousands), and *Hotun* (Millions). From this repetition, it can be concluded that the number in the Dawan dialect of the Amanuban syllable is a base 10 number.

Based on the explanation above furthermore regarding the use of numerical literacy in the Dawan language, the Amanuban dialect is presented in Table 2.

Table 2 shows that in the mention of the tens 10, 20, and 30 numbers using the concept of multiplication between the tens numbers, namely ten and the unit numbers 1, 2, and 3, then for the mention of numbers 11-19, 21-29 and so on using the concept of multiplication between the tens and the units and addition with the unit number. In the Dawan language, the Amanuban dialect, 20 is referred to as *bo nua* where *bo* is ten multiplied by *nua* as the base number, which is two. Furthermore, the mention of 21 is *bo nua am mese* where *bo nua* is the base number of tens, namely 10 * 2, then the word *am* which shows the addition operation with *mese*, namely one as the unit base number, as well as other numbers as in Table 3.

Table 3 shows that the number assignment is consistent with the multiplication concept used for the tens, hundreds, thousands, and millions with the unit number and addition with the unit number. This shows that the Amanuban people have numerical abilities in pronouncing numbers which is then also used in the mention of the name of the day as in Table 4.

TABLE 2: Numerical literacy in numbers 1-30.

| Number | Dawan Languange (Amanuban's Dialect) | Numerical Literacy | Number | Dawan Languange (Amanuban's Dialect) | Numerical Literacy |
|---|---|---|---|---|---|
| 1 | Mese | 1 | 16 | Bo Mese am Ne | (10*1) + 6 |
| 2 | Nua | 2 | 17 | Bo Mese am Hitu | (10*1) + 7 |
| 3 | Tenu | 3 | 18 | Bo Mese am Fanu | (10*1) + 8 |
| 4 | Ha | 4 | 19 | Bo Mese am Sio | (10*1) + 9 |
| 5 | Nima | 5 | 20 | Bo Nua | 10 * 2 |
| 6 | Ne | 6 | 21 | Bo Nua am Mese | (10*2) + 1 |
| 7 | Hitu | 7 | 22 | Bo Nua am Nua | (10*2) + 2 |
| 8 | Fanu | 8 | 23 | Bo Nua am Tenu | (10*2) + 3 |
| 9 | Sio | 9 | 24 | Bo Nua am Ha | (10*2) + 4 |
| 10 | Bo Mese (Bo'es) | 10*1 | 25 | Bo Nua am Nima | (10*2) + 5 |
| 11 | Bo Mese am Mese | (10*1) + 1 | 26 | Bo Nua am Ne | (10*2) + 6 |
| 12 | Bo Mese am Nua | (10*1) + 2 | 27 | Bo Nua am Hitu | (10*2) + 7 |
| 13 | Bo Mese am Tenu | (10*1) + 3 | 28 | Bo Nua am Fanu | (10*2) + 8 |
| 14 | Bo Mese am Ha | (10*1) + 4 | 29 | Bo Nua am Sio | (10*2) + 9 |
| 15 | Bo Mese am Nima | (10*1) + 5 | 30 | Bo Tenu | 10 * 3 |

TABLE 3: Numerical literacy in numbers 40 and beyond.

| Number | Dawan Languange (Amanuban's Dialect) | Numerical Literacy | Number | Dawan Languange (Amanuban's Dialect) | Numerical Literacy |
|---|---|---|---|---|---|
| 40 | Bo Ha | 10 * 4 | 999 | Natun Sio am Bo Sio am Sio | (100*9)+(10*9)+9 |
| 50 | Bo Nima | 10 * 5 | 1000 | Nifun Mese (Niuf'nes) | (1000*1) |
| 60 | Bo Ne | 10 * 6 | 2345 | Nifun Nua am Natun Tenu am Bo Ha am Nima | (1000*2)+(100*3) +(10*4)+5 |
| 70 | Bo Hitu | 10 * 7 | 2999 | Nifun Nua am Natun sio am Bo Sio am Sio | (1000*2)+(100*9) |
| 80 | Bo Fanu | 10 * 8 | 10000 | Nifun Bo Mese (Nifun Bo'es) | (1000*10*1) |
| 90 | Bo Sio | 10 * 9 | 20000 | Nifun Bo Nua | (1000*10*2) |
| 100 | Natun Mese (Naut'nes) | 100 *1 | 100000 | Nifun Natun Mese | (1000*100*1) |
| 101 | Natun Mese am Mese | (100*1) +1 | 1000000 | Hotun Mese | (1000000*1) |
| 110 | Natun Mese am Bo Mese | (100*1)+10 | 2000000 | Hotun Nua | (1000000*2) |
| 111 | Natun Mese am Bo Mese am Mese | (100*1)+10+1 | 3000001 | Hotun Tenu am Mese | (3000000*1)+1 |

Table 4: Numerical literacy in mentions of days.

| Day | Dawan Languange | Indonesian |
|---|---|---|
| Monday | Neon Mese | Hari pertama |
| Tuesday | Neon Nua | Hari kedua |
| Wednesday | Neon Tenu | Hari ketiga |
| Thursday | Neon Ha | Hari keempat |
| Friday | Neon Nima | Hari kelima |
| Saturday | Neon Ne | Hari keenam |
| Sunday | Neon Hitu/ Neon Kle | Hari ketujuh/ Hari gereja |

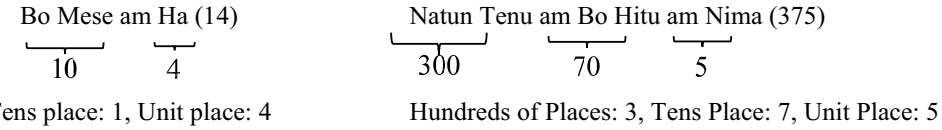
Based on Table 4, it can also be seen that the Amanuban tribe calls the names of the days according to the order in the unit number system. As for Monday, it is called the first day because according to the Christian belief of the Amanuban people that the first day of the creation story of the universe is Monday to Sunday as the seventh day or the day of rest which is also called the day for church.

Numerical literacy in the Dawan language system, the Amanuban dialect, is unique in the mention of numbers and names of days that are closely related to the culture of the Amanuban community itself. This is following the contextual and socio-cultural principles of numeracy literacy and ethnomathematics. Numerical literacy is practical (used in everyday life), is related to citizenship (understanding issues in the community), professional (in work), recreational (for example, understanding scores in sports and games), and culture (as part of deep knowledge and civilian culture) [13]. The scope of numeracy literacy is very broad, not only in mathematics but also intersects with other literacies, for example, cultural and civic literacy. Furthermore, important thinking about ethnomathematics is also based on two things, namely the concept of mathematics and culture as a result of human thought and information processing in individual cognitive structures that are carried out to meet their needs, especially in their social interactions. Anderson [25] states that ethnomathematics is developed by cultural groups and serves their natural interests stemming from their social situations.

Numerical literacy is a part of mathematics where the numeracy literacy component is taken from the scope of mathematics in the 2013 curriculum. The uniqueness of the number designation in the Dawan language system, the Amanuban dialect can be used as a reference in mathematics learning for low-grade students, namely students in grades 1 to 3 at the elementary school level to develop components of numerical literacy, namely estimating and calculating with integers which is the scope of the 2013 curriculum mathematics subject to numbers. Students who are fluent in the Dawan

language will find it easier to understand the concept of numbers when learning it in a language that is mastered and used daily.

Students will be able to count and understand the sequence of the smallest to largest numbers *from mese, nua, tenu, ha, nima, ne, hitu, faun, sio, bo'es, bo mese am mese* and, so on then proceed with writing the number notation 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11,.... Furthermore, the concept of the place value of a number in a certain number according to the level of both units, tens, hundreds, thousands and, so on can also be taught using the Dawan language, namely:




Tens place: 1, Unit place: 4 Hundreds of Places: 3, Tens Place: 7, Unit Place: 5

The concept of addition and multiplication can also be taught using the Dawan language as presented in Tables 2 and 3. Numeration can be interpreted as the ability to apply number concepts and arithmetic operations skills in everyday life and the ability to interpret quantitative information contained in the environment. around. This ability is shown by being comfortable with numbers and being able to use mathematical skills practically to meet the demands of life. This comfort can be created through a cultural approach including everyday language that is inherent in students. The numerical literacy in the Dawan language system of the Amanuban tribe shows that the concept of mathematics cannot be separated from people's life. Mathematics plays a role in investigating scientific technology and activities in human development [26]. In other words, the ethnomathematics power generated in this study challenges the assumption that mathematics is only produced by mathematicians [27]. Ethnomathematics provides a good way to express mathematical concepts that grow and develop naturally and surely according to the daily needs of society [28,10].

## 4. CONCLUSION

The numerical literacy in the Dawan language system, the Amanuban dialect used by the community when using the number system is very unique. The uniqueness is that the community uses the base 10 number system with the unit base number 0 to 9 and the tens base number 10 which is used to calculate the next number using the concept of multiplication and addition. The mention of the name of the day in the Dawan language of the Amanuban dialect is also based on the unit base number system. This uniqueness can be used as a reference in mathematics learning with numbers, especially the concept of number sequences, the place value of a number,

and addition and multiplication operations on integers for low-grade students who are fluent in Dawan.

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