

Indigenous Geometrical Knowledge of Tamang Community from Their Cultural Practices

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Abstract— The main concern of this paper was to explore ethno mathematical practices of geometry in the Tamang people and linking these practices in the primary level of our formal education. The research site of this study was Lurpung village of Kaverpalanchowk district of Nepal. The paper base on qualitative inquiry with Purposive sampling techniques and the researcher has doing; included Tamang people as data sources. On the basis of interview with Tamang people, and observed their workplace and came up to the conclusion that sketch or design of cultural dress blouse as curve lines, cultural food timsuraalum as triangle, and surface of jantar as quadrangular and mathi, cheptemhar, base of kulagi, dampfu and two sided drum of bonbos and lamas as circle. From the musical instrument dampfu, we can encourage students to draw a similar sketch in their exercise book when they learn to draw circles. To teach the quadrants, parallel lines, perpendicular lines, circular shapes we can sketch the knowledge from Nanglo. In sketching Doko, there are many geometrical concepts like square, rectangle, parallel lines, circular shape, right-angled triangle, and many others.

Keywords— Tamang, Indigenous, Geometrical concept, Culture, Practices

I. INTRODUCTION

Tamang is an ethnic group of Nepal. They mostly reside around the Kathmandu valley since the time immemorial. Their traditional area is the hilly region between the Budhigandaki River and the Likhu River. At present, they live in large numbers in the district mans which is surrounding spread (Kathmandu valley) of Rasuwa, Nuwakot, Dhading, Makawanpur, Sindhuli, Ramechhap, Dolakha, Lalitpur, Sindhupalchok and Kavrepalanchok in the Central Development Region. The total population of Tamang in Nepal, is 1539830 (Census, 2011) which associate for 5.8 per cent of the total population of the country. They are indigenous peoples with their own cultural pattern developed over a period. During the 8th century the Tibetan King employed the Tamangs as the border patrol to protect the people and lands of Tibet and hence they were the 'Horse Warriors' (Blon, 2007).

Before unification of Nepal, Tamangs occupied the Terai, Hills in the 7th century. Nepal was formed later in the 18th century and saw a slow assimilation of the Tamang group with other communities in the region (Gole, 2015). Around the 18th century following conquests from other communities, the land owned by the Tamangs were taken away and distributed to the new rulers of the region. The Tamangs mostly believe in 'Bon' Dharma, which is one of the Buddhist religions and is known as the Buddhist cultural system. Bon has a system of six types of societal leaders: Tamba, Ganba, Bonbo, Labonbo, Lama and Choho to keep the Tamang society continuously alive and dynamic. The six have their

respective and important roles to play in the development of Tamang society. The Tamba looks after the cultural aspect and has a very important role to play in marriage ceremonies. The Lama carries out death rites (Ghewa) and undertakes activities related to the Buddhist religion. The Bonbo propitiates the local gods and goddesses and assists by providing treatment to the sick and needy in the village. The Labonbo (Laptaba) keeps alive the history of the clan and lineage through the worship of the clan deities.

The Tamang community is very rich in culture and there are many different kinds of ethno-mathematical knowledge in the way they measure, count, do local business, estimate, way of farming, storing grain etc.. Nevertheless, students of the community fail to tackle the same problems of the course book. Mathematics was for a long time regarded as a neutral and culturally- free discipline removed from social values (D'Ambrosio, 2001). Students must learn the relevance of culture and personal experience because all people have their own realities. In this context (Blon, 2007) stated that ethno mathematics is not only the study of mathematical ideas because it is also the study of anthropology and history. Therefore, a teacher should be aware of the diverse identities of students or multicultural classroom. A classroom is a community of multicultural students where each student has his/her own values and cultures different from others. The cultural background or ethnicity of students can be used as resource for learning. The activities can be addressed by ethno-mathematics.

In this context, this paper argues that the power structures of western forms of pedagogies have been denying using Tamangs' ethno-mathematical practices in the classroom context. How are the indigenous practices embedded in Tamang cultural practices? The paper tries to highlight the ways of incorporating the Tamang indigenous cultural practices in the teaching learning processes of geometry.

Methodology

For addressing the research question, the qualitative design with ethnography approach has been used. As this research is intended to understand and describe a social and cultural scene Fetterman(2010) of the Tamang, ethnography approach was used for data collection. In this context Neuman (2008) explained ethnography as the field study research that emphasizes providing a very detailed description of a different culture from the view point of an insider in the culture to facilitated understanding. Qualitative research is multi method in focus, involving an interpretive, naturalistic approach to its subject matter (Creswell, 2012). Ethnography helped the researcher to explore socio-cultural perspectives of Tamang people. As this study is based on ethno-mathematical knowledge of the Tamang, it was obvious to go to the place where in the occupation or work place. It involves studying subjective information of social world through people's daily life activities, life events, culture and perception. The research site of this study was Kaverpalanchowk district. A purposive sampling technique was adopted in this study because it is one of the most common strategies in qualitative research (Ary, Jacobs & Sorensen, 2010). In so doing, I observed the work place of Tamang people from Lurpung village.

An observation guideline and an interview schedule were the main tools of generating information. So the researcher observed the cultural practices of Tamang people for many days through developing close relation with the participants. Then listened them carefully and participated in their cultural practices such as in rituals and ceremonies and recorded what they said and observed how they acted and behaved in their cultural context. The researcher discussed with many other people such as Tamang leaders, professional people, teachers, farmers, senior adults and students. Moreover, I visited their workplace, house, farms, and schools and so on for understanding the phenomena.

The researcher observed cultural phenomena and maintained field notes or memos of the field experiences and impressions that I got. The interviews and observations were informal and unstructured in nature. The data thus obtained from the field were categorized according to the themes regarding to the geometrical concepts embedded in Tamang cultural practices. It was analyzed and interpreted the information collected from the field. Further, the data were triangulated with theory and

literature and then generated meaning without missing the essence of the participants' voice of this study.

Analysis and Interpretation

The obtained data were analyzed on the basis of following themes emerges from the voice of the participant:

Geometry in Cultural Dress and Ornaments

I went to my research site on Sonam Losar on 25th Magh, 2072 from Kathmandu at noon. I had reached Lurpung Village of Kaverpalanchowk District in the evening after taking 5 hours of travelling by bus. When I reached there, people were preparing and managing themselves to celebrate Losar. On the 26th Magh, They were celebrating Losar. At that time I met LhakpaTamang (social leader of the Lurpung Village, 64 years) and request to explain about Sonam Losar. According to him Sonam Losar falls on different dates each year in Bikram Sambat and English calendar. This calendar is ancient Tibetan/Chinese lunar calendar. The New Year usually falls on the second new moon after the winter solstice (rarely the third if an intercalary month intervenes). That is it is on Magh Sukla Pratipada, under the eastern lunar calendar. The Tamangs have a tradition of counting year with the association of symbols of 12 different animals. It starts with the Rat, Ox, Tiger, Rabbit, Dragon, Snake, Horse, Goat/Sheep, Monkey, Rooster, Dog, and Pig/Boar.

The last day of the 12th month of the year is a time to clean and prepare a welcoming atmosphere for New year. The monasteries perform a special ritual with mask dance to expel negative forces. The New Year celebration varies. People go to Monasteries, Stupa, and Chaityas and perform ceremonial rituals there. People buy new dresses and decorate their house according to their living standards. Tradition is that every family thoroughly cleans their house to sweep away any bad fortune in hopes to make way for good incoming luck. Windows and doors are decorated with colorful papers, cloths, and couplets with popular themes of "good fortune" happiness, "wealth", and "longevity". People get together and have dinner with families. Also musical programs are performed with Tamang Selo in the beat of Damphu.

Now-a-days Tamangs in Kathmandu and nearby gather in Tudikhel to celebrate Sonam Losar. They organize different programs there. The attractions are generally Pooja, LokDohori competitions, Food Festivals, Dramas, etc. The Tamangs are seen in their own costumes. The Tudikhel is full with the crowded with the Losar celebrations. Women and girls wear their dresses and jewelry and most of them wear a traditional hat.

Tamang Dresses

Tamang women generally wear typical Tamang dresses called *aangre*, *lungi*, *kulagi*, and *ke* with ornaments like *jantar*, *cheptemhar*, *mathi*. The *lungi* is in a rectangular shape. The *kulagi* is a cap which looks like a lidless prism having a circular base. Where as *aangre* is a blouse patterned with curve and straight lines. Similarly *ke* is a belt in the shape of a rectangle. Their ornament, *jantar* is a necklace in the shape of a rectangle, *cheptemhar* and *mathi* are earrings and bracelets respectively in the circular shapes.



On this occasion, the lamas started to read *chhyo* and play the instruments like *nghaa*, *syang* and *damara*. *Nghaa* and *daamaaraa* are made using goat skin in the shape of a prism having a circular base. *Nhaa* is made up of wood with the shape of a curve line and on its top of is a small thing looking like a sphere. *Syang* is a bell made up of metal, in the shape of a cone. The lamas continuously read *chhyoi* for 2-3 hours, after the program is over and all the participants return.

One of the culturally rich communities in Nepal is the Tamang community. In this community, Sonam Losar is the most celebrated festival. On this day, people of the community like to wear cultural dresses and show their cultural identity. When we observe the cultural dress closely, we find geometrical interpretations (curve lines, straight lines, rectangle, circle, quadrilateral, prism, cuboids, sphere etc.). In this way, like mathematics is seen as a process, and as a human activity, rather than just as a set of academic content [5]. This means mathematics is a cultural product and that every culture has developed its own forms of mathematics. Therefore, these concepts help students also value and appreciate their own previous mathematical knowledge, cultural activities from a mathematical point of view thereby allowing them to make the link between school mathematics and the real world and daily life in this globalized society.

Traditional Foods and Solid Objects

Lochhar is the festival celebrated by the Tamangs from ancient times. The Tamangs have realize its importance and originality and are still celebrating Lhochar. On Lochhar day the Tamangs go to visit monastery and honorable Rinpoche and offer *khatag* to Rinpoche and others Buddhas in the monastery. While offering *khatag* they pray for good crops, good job, good health and better life in the new year to come. They invite relatives for feast as well as visit the respectable people in the community. They dress themselves

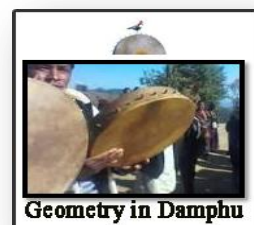
the best they have and dance, sing and dine together with the family members. In Kathmandu, Lochhar is celebrated in open field at Tundikhel, Swayambhu, Patan, Boudha etc. It is customary that Lhosar should be celebrated at open fields as it used to be celebrated in the ancient times with *damphu*, the traditional musical instrument simply made up of wood and animal hide. Nepal Tamang Ghedung, the most popular and powerful organization of the Tamangs organize the Lhosar celebration. Distinguished Tamangs invited as guest join the festival celebration ceremony. While celebrating Lhochar they forget all their sorrows, hardships, difficulties and celebrate in joyful and happy mood singing Tamang *shelo* and beating of *Damphu*. The meaning of 'Lho' is year and 'Chhaar' is new. Thus, Lhochar means New Year. Altogether 12 Lho (years) in Tamang calendar are mentioned. The Lhochar is commonly scheduled and celebrated for five days. In Lochhar, they especially and mostly prepare different kinds of *aalums* such as *chyeaalum* which looks like a sphere, *sutumbaaalum* a shape as cylindrical and *timsuraalum* ashape like a triangle. It is made up buck-wheat.

It is said that on this day, even anger has to be suppressed, so, a nice family environment would created. The relatives are called for a joint feast and they dance on the beats of the *Damphu* which has a circular base, lidless prism and *Tunga*. Its strings look like straight lines. But they start their first day, praying of *Lamas* for the peace and prosperity of the world. The *Lamas* dance in a circle worshipping the God and controlling bad spirit. After this session, *Darjyu* is hung in front of the house on vertically up on the yard. It looks like the combination of a cylinder (a long bamboo stick) and a quadrilateral (flexible cotton of width- length of 1" x 5"). In this way, they are engaged all the five days.

If we observed from a geometrical perspective, we can find Euclidian plane geometry and solid figures (three dimensional things) on their musical instrument, *Lamas* dance and cultural food *aalum*. This shows that in culture there is deep mathematical concept, construction and knowledge which "provides an important opportunity for educators to link current events and the importance of these artifacts in the context of ethno-mathematics, history, and culture" (Rosa & Orey,2008). So, mathematics is a cultural product which needs to be acknowledged such as in the classroom, for the purpose of meaningful learning of the subject in developing countries (D'Ambrosio, 2001)

Geometry in Damphu

Damphu is a double-sided disk-shaped drum with leather top and with a long wooden handle. This is a very rare musical



instrument belonging to the indigenous Tamang Community. Damphu is a percussion instrument similar to a big tambourine. This instrument is used to play the melodious Tamang selo. The popular ancient folk instrument Damphu, and the original rhythm of Tamang Selo have a unique importance and influence in Nepalese culture and folk music. This instrument is very easy to play and can be added to learn such concepts circle, radius, diameter and circumference.

Geometry in Kalli and Sir-Ful

Kalli is one of the most popular cultural ornaments in Tamang community. They wear this ornament in their festivals.

Circumference of circle = πd

Area of circle = πr^2

Diameter = $2r$

From above figure those are cultural ornaments in Tamang community.

Sir-Ful and Kalli both are in circular shaped. In Sir-Ful we can see beautiful pattern of different shaped circles and red represents exactly at the centre of circle.



there is a concept of regular hexagon which clearly seen in the figure which can be used as instructional material which would be useful for teaching the concept of regular polygon.

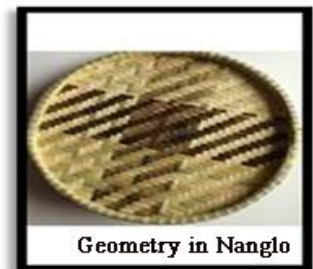
Geometry in Jantaar

Jantaar is one of the famous ornaments were by women of the Tamang community. It is made up of metal like silver, gold etc. Jaantar is tie-in with mugako mala. In Jantaar, there is a square shape. When teaching the concept of square, rectangle we can use Jantaar as an instructional material .



Geometry in Nanglo

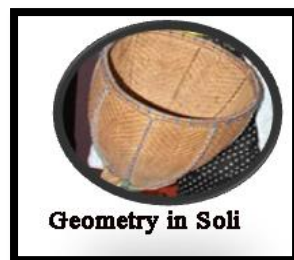
Nanglo is used for making floor and grains pure from the mixture of any other unwanted thing. It is made up bamboo. In nanglo we can see many different types of geometrical shapes such as quadrants, parallel lines, perpendicular lines



and nanglo itself a circular shape. Most of the Tamang student have seen the nanglo used by their parents, neighbours in the daily life activities. But they find it difficult to interlink nanglo with geometrical knowledge. They only know nanglo is daily life material. Nor does the teacher use nanglo as a material for teaching geometry at the primary level. *Nanglo* is a popular artifact in every rural Nepali house not only in the Tamang community. As a whole it is circular disc, inside it there are various geometrical patterns and forms. It not only supports teaching simple geometry of lines, angles, triangles, rectangles but also it supports teaching coordinate geometry too. The horizontal and vertical intersecting lines can be regarded as two perpendicular axes. The beautiful patterns form images around a fixed line as a line of reflection. Also it can be useful in teaching line symmetry and point symmetry. The Nanglo can be rotated about a fixed point at the center which is the origin, and be useful to teach the concept of rotation in geometric transformation. At the same time it can be helpful to teach reflection about axes of x and y. There are two sides of the Nanglo. The first picture below is the front or ventral side and the next one below it is the opposite or dorsal side. The two sides are not identical and both sides can be used for different purposes while teaching geometry with the help of it.

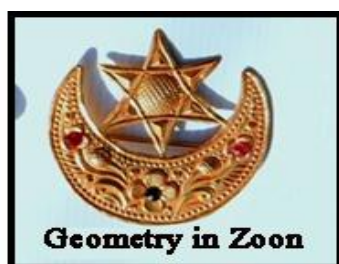
Geometry in Soli

Soli is one of the most popular cultural artifacts in the Tamang community. The Tamang community uses this artifact to carry Sagoon in cultural rituals. From the figure, we can see the Soli itself is in a cone shape. It is connected with geometry and represents a unique geometrical shape in the Tamang culture. It is clearly seen in the figure soli ,slant height, height, vertex, circle. By the help of this artifact we can give the concept of such things.



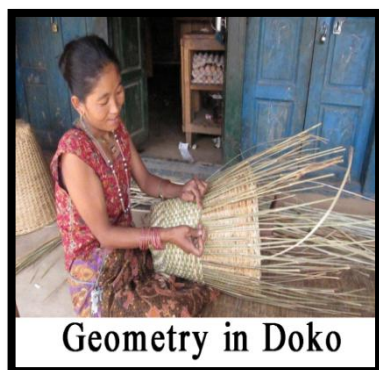
Geometry in Zoon

Zoon is an ornament which women wear on their front side of hair. It is made with gold and occasionally used by the Tamang women to see beautiful. In zoon,



Geometry in Doko

Doko is a very common artifact that we could see in Tamang community. It showed a great application of geometry in the art of making doko with bamboo pieces. A single doko carries several meaning in geometry, arithmetic, measurement, logic and



reasoning. It is a combination of art and mathematics in real sense that can be a living context in the classroom such as teaching of lines, curves, polygons etc.

Mina Tamang is professional to make doko. When I met her in the village she was making a doko. The figure above is a doko and it shows the practices of applying geometry and arithmetic in the making of artifacts. It can provide a rich context for the children to learn parallel and intersecting lines, circle, polygons and many more. In each step there are mathematical (geometrical) concepts. This will be an effective mathematics teaching material, which is available locally and used in the daily life in Tamang Community.

Findings

Based on data collection and interpretation the following findings were drawn:

Geometrical Concepts Embedded in Everyday Activities of Tamang Community

- Sketch or design of cultural dress blouse as curve lines, cultural food *timsuraalum* as triangle, and surface of *jantar* as quadrangular and *mathi*, *cheptemhar*, base of *kulagi*, *damphu* and two-sided drum of *bonbos* and *lamas* as circle.
- From the musical instrument *damphu*, we can encourage students to draw a similar sketch in their exercise book when they learn to draw circles.
- To teach the quadrants, parallel lines, perpendicular lines, circular shapes we can sketch the knowledge from Nanglo.
- In sketching Doko, there are many geometrical concepts like square, rectangle, parallel lines, circular shape, right-angled triangle, and many others. They have high degree of estimation skill when they prepare their artifacts.

Conclusions

The geometrical knowledge is strongly embedded in socio-cultural activities of the Tamang community. School level geometrical knowledge can be made more interesting and worthwhile linking it with socio-cultural activities such as religious ritual, cultural foods, cultural ornaments, and cultural design of clothes, artifacts. Teaching learning process of mathematics can be made easy and effective by linking formal mathematics to daily life mathematics. It helps to improve pedagogy of the teacher. Ultimately, it helps the students and teachers to improve their field. The Tamangs cultural practices are rich in terms of geometrical concepts embedded in them. These concepts were generated with the very beginning of their ancient civilization. However, these concepts are denied to recognize and use in mathematics classes due to the subjugation of imported ways of knowing and knowledge of mathematics. Incorporation of these cultural practices in teaching learning activities in the classes of mathematics may facilitate to contextualize the learning making it more meaningful. The mathematical concepts embedded in such cultural practices serve as a prerequisite to the learners for constructing the newer mathematical concepts. Therefore, all Tamang people' knowledge is derived from and passed down from their ancestors outside of the formal schooling context so that we should incorporate this knowledge in formal education system also.

References

- [1] Ary, D., Jacobs. C., & Sorensen, C. K. (2010). Introduction to research in education (8th edition). Belmont, CA: Wadsworth.
- [2] Blon, B. B. (2007). Tamang itihās ek jhalak. Kathmandu: Didi Bahini Offset Press Pvt. Ltd.
- [3] Census, N. P. (2011). *National population census*. Kathmandu Nepal: Central Bureau of Statistics.
- [4] Creswell, W. J. (2012). *Educational research: planning, conducting, and evaluating quantitative and qualitative research*. New Delhi: Sage Publication.
- [5] D'Ambrosio, U. (2001). *Ethnomathematics; link between traditions and modernity*. Taipei: Sense publishers.
- [6] Fetterman, D.M. (2010). *Ethnography: Step by step* (3rd edition). Thousand Oaks, CA: Sage.
- [7] Gole, M. (2015). *Tamang samaj (Itihās ra Maulik Sanskriti)*. Kathmandu: Didi Bahini Offset Press Pvt. Ltd.
- [8] Neuman, W.L. (2008). *Social research methods: Qualitative and quantitative approaches* (6th edition). New Delhi, India: Dorling Kindersley.
- [9] Rosa, M. & Orey, D. C. (2008). *Ethno-mathematics and cultural representations: Creating high achievement classrooms, schools, and districts*. Thousand Oaks, CA: Corwin Press, Inc.
- [10] Tamang, A. Y. (2006). *The context of Tamang identity*. Kathmandu: D. R. Public Housein.