

**GEOMETRICAL CONCEPT PRACTICED IN MUSLIM COMMUNITY**

**A**

**THESIS**

**BY**

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## LETTER OF CERTIFICATE

This is certify that Mr. **Chandra Mani Belbase** a student of academic year 2072/074 with Campus Roll Number 02 Thesis Number 1418 Exam Roll Number 7228267 and T.U. Registration Number 9-2-411-38-2012 has completed his thesis under supervision of Ms. Sarala Luitel for the period prescribed by the rules and regulations of Tribhuvan University, Kirtipur, Kathmandu, Nepal. This thesis entitled "**Geometrical Concept Practiced in Muslim Community**" has been prepared based on the results of his investigation. I recommend and forward this thesis be submitted for the evaluation as the partial requirement to award the degree of Master Education.

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Date: March 31, 2021

## LETTER OF APPROVAL

This thesis entitled “**Geometrical Concept Practiced in Muslim Community**” has been approved in partial fulfillment of the requirements for the Master’s Degree in Mathematics Education.

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## RECOMMENDATION FOR ACCEPTANCE

This is to certify that Mr. Chandra Mani Belbase has completed his M.Ed. thesis entitled “**Geometrical Concept Practiced in Muslim Community**” under my supervision during the period prescribed by the rules and regulations of Tribhuvan University, Kirtipur, Kathmandu, Nepal. I recommend and forward his thesis to the Department of Mathematics Education for the final viva-voce.

.....

Ms. Sarala Luitel

(Supervisor)

Date: March 31, 2021

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## **DEDICATION**

This work is heartily dedicate to my respected parents Shree Dilaram Belbase and Umkala Belbase , my dearest friends Deepak Pokhrel , Sister Hira Belbase, Brother Netra Prasad Belbase and all my family member who supported me in each and every steps of my life for what I am now.

## DECLARATION

This thesis contains no material, which has been accepted for the award of other degree in any institution. To the best of my knowledge and belief this thesis contains no material previously published by any authors except due acknowledgement has been made.

.....

(Mr. Chandra Mani Belbase)

## ACKNOWLEDGEMENT

I am highly indebted to my teacher Ms. Sarala Luitel for continuous guidance, creative suggestion, generous comments, encouragement and inspiration to complete this thesis on time. Her valuable suggestion have become the greatest wealth of this thesis.

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Date: March 31, 2021

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### **Abstract**

This study aimed to find out geometrical knowledge in Muslim community and explore the relation of Muslim cultural mathematical practices to primary level mathematical knowledge. Also seeking out the Muslim practice geometrical knowledge how to apply teaching learning activities for primary level mathematics. The research designed of my study is qualitative with ethnographic approaches where ethnography is the indepth study of human culture . So, my research site is Banganga municipality of Kapilvastu district where selected four parents ,four students and three mathematics muslims teachers purposively. There were different tools used in data collection in my researched ,primary data was collected from observation, interview and photography and secondary data was collected from different journal , article ,books and other published and unpublished documents. Based on the interpretation and analysis of the data it found that the Muslim culture holds innumerable mathematical ideas in their daily life used in basket, clay , wooden materials and their religion. But children had limited knowledge about the formal mathematical concepts . They were writing mathematics in practical but not connect in formal mathematical cognitive process. By taking interview to primary level Muslim teachers and students, they were less informed about Muslim mathematical knowledge applied in teaching learning activities.

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## **CHAPTER - I**

### **Introduction**

#### **Background of the Study**

The school where I teach has a majority of students from the Muslim community at primary level. However, their achievement in mathematics is very weak. It is very difficult to explain general mathematical concept to them. Also I have seen students take mathematics as a very difficult subject. Since I live in a village close to the Muslim community. I have been seen the use of mathematical concepts in their daily activities of Muslim community as well. The question of how to explain mathematical concepts to the students has on my mind for a long time. I have decided to conduct my own research in the Muslim community, especially with the aim of providing effective education to the Muslim minority in Nepal.

When I was considering where to conduct my thesis in mathematics there were many who encourage me to do my thesis in Brahmin community because I was born in Brahmin community. But my interest has always been in Muslim society and Brahmin community there is no shortage of important issue to conduct research on . However professionally, I felt that I needed to gain a fresh perspective on Muslim community. I have lived in nearest to the Muslim village. So I had excited to conduct research on Muslim community.

The mathematics is developed according to the human needs and mathematics is related to human activities and his values. Therefore, mathematic is a creation of cultural activities. Where culture is a very broad term that includes our walks of life, our modes of behaviour, our philosophies and ethnics, our morals and manners, our customs and tradition, our religious, political, economic and other types of activities. Culture practice is the source of mathematical knowledge. Mathematics as a plan is cultural phenomena (Bishop, 1988, p. 589). Culture and mathematics have a strong directly proportional and circular connection. Cultural institution influences the mode of mathematics teaching, learning and curriculum development.

In Muslim cultural geometry is everywhere, these are the opening words of animated lesson entitled“ Geometrical concept practiced in Muslim community”. The basic geometrical operation that seen in every public and private house and masjid of Muslim community . The Muslim design the in tricate pattern that adorn masjid, madrasas , home and house used materials which made by Muslim women. The most complex design can be created from two simple hand held drawing tools , a compass

and a straight edge . Edge the narrow example, everything starts with circle is the major decision of Muslim. There are so many geometrical pattern seen in Muslim culture and there handcraft materials. Also we can find geometrical pattern in their daily work activities.

In the context of Nepal Muslim people are rich in the culture. There are different ethnic group find in the Nepali society. Different types of mathematical knowledge are practices in Muslim community. From ancient period because they have their own language, life style and socio-cultural value. So Muslim culture and mathematics have a relationship. Mathematics is always developed in the society as the product of culture, i.e. culture has significant role in the development of mathematics and also mathematics has significant role in the development of culture. There is no any doubt to the fact that mathematics creates culture and culture creates mathematics which are inherent to each other ( Skovsmose, 2006, P.7).

### **Introduction of Muslim**

Nepali Musalman are people residing in Nepal who follow the religion of Islam. Their ancestors arrived in Nepal from different parts of South Asia, Central Asia and Tibet during different epochs and have since lived amidst the numerically dominant Hindus and Buddhists Mishra, R. (2007).

About 97% of the Muslim community live in the Terai region, while the other 3% are found mainly in the city of Kathmandu and the Western hills. The community numbers 971,056, about 4.4% of the total population of Nepal. Districts with large Muslim people include Sarlahi (9.9%), Rautahat (17.2%), Bara (11.9%), and Parsa (17.3%) in the central Terai bordering the status of Bihar, Kapilvastu (16.8%) and Banke (16.1%) in the Western Terai and Siraha (7%) and Sunsari (10%) and Saptari 10% eastern Terai. (National Muslim Commission, 2017)

Muslims have lived in Nepal for long period of time and have shared common historical experiences with the Hindu majority, and as such have developed a stronger identification with the Nepali state. However, the Terai Muslims, on the other hand, like other Terai communities also continue to have strong ties across the border and receive culture. Nepali historians believed that the first Muslims settled in Kathmandu during King Ratna Malla's reign in the late 15<sup>th</sup> Century. Kashmiri traders where probably the first Muslims to arrive, followed by Afghans, Persians and even Arabian. The Bajar in Indrachowk gets its name from the tragimerchants Singh, C.P (2011).

The Choubise Rajas of west Nepal also employed Afghan and Indian Muslim to train Nepali soldiers to use firearms and ammunition. Ratna Malla's envoy to Lhasa invited Kashmiri Muslims to Kathmandu in an attempt to profit from the rags, carpets, shawls and woolen goods they traded between Kashmir, Ladakh and Lhasa.

### **Statement of the Problem**

Nepal is one of the beautiful countries in the world with 2.6 billion population of 125 ethnic groups and their 123-mother language (National Population Census, 2011). That is Nepal is a multi-cultural multi-lingual country. Where every groups have its own religions, social, professional and culture belief. Mathematics is a compulsory subject of school level and it is also essential components of school and higher education. The need of mathematics is apparent for everyday life as well as for higher studies in the field of science, engineer management, education and technology. Previously studies established that the overall picture of Muslim's participation in mathematic was low moreover the participation of Muslim girls in Mathematics is very poor. Lower achievement and the participation of Muslim in mathematics reflect their position in society, poverty, social aspect, educational develops the human resources which are interpreted a process of increasing the knowledge, skill and capability of all people in the country but in context of Nepal all people don't get equal opportunity of education due to social, economic and cultural barriers. Some educationist said that the lower participation of Muslim (specially girls) in mathematics education is due to the cultural as well as religions reasons. We know that due to education, change in awareness of the people as well as economic status. People are being aware and they are given education to girls at higher level. But many Muslim students cannot be seen in universities. Especially Muslims community send his/her children in Madarasa.

I indent to find out the mathematical practices in Muslim community. So, this study tried to answer the questions. How do Muslim people practice mathematical knowledge in their cultural artifacts and how can make the relation of Muslim, cultural mathematical practices to primary level mathematical knowledge. What types of geometrical concepts are being used by Muslim community in their traditional equipment? Therefore, this study was focused on the cultural mathematics practices in Muslim community. Thus, such question occurred to my mind. So, I was motivated to carry out this research in this area.

### **Objectives of the Study**

The objective of this study is to find out mathematics practices in Muslim community. These specific objectives are following:

- To find out the basic geometrical concept practiced in Muslim community.
- To explore the relation of Muslim cultural mathematical practices to primary level mathematical knowledge.

### **Research Question**

This study is concerned with investigation the mathematical practices in Muslim community especially in geometry. In the course of this study the search answers to the following questions.

- How do Muslim community people practice geometrical concept in their cultural artifacts?
- What type of Geometrical concept practice in Muslim community in their cultural artifact?
- How can make the relation of Muslim cultural geometrical practices to primary level mathematical knowledge ?

### **Significance of the Study**

This study reflects the indigenous mathematics knowledge and skills. This study helps the teachers, students, educationist, curriculumist to use the indigenous mathematics knowledge and skill. Mathematics is an essential part of school curriculum so every students should study school education i.e. grade one to ten in Nepal. Mathematics has teaching for all students as a compulsory subject at school level as well as optional subject. Therefore, this study has be helpful for teacher, school counselors, policy makers, curriculum maker, researcher etc. Further, the result of this study helps in following way.

- This study suggests the math teacher to address cultural diversity in teaching mathematics.
- This study helps to promote ethno-mathematical knowledge.
- It helps to motivate and encourage to the Muslim students is to the study of the mathematical concept and practicing in Muslim students
- This study helps the curriculum designer, educational planner, politicians and parents has also be obligated to think about the ethno-mathematics and it's incorporating in the school curriculum.
- To find different kinds of teaching materials teaching method which are locally available.



### **Delimitation of the Study**

Following are the delimitation of the study.

- This study has delimit within the geographical boundary of Banganga-municipality in Kapilvastu district only.
- This study has based on qualitative design.
- This study has based on only Muslim ethnic groups.
- This study have been intend to study the mathematical knowledge practices in Muslim community and their relation to primary level mathematical knowledge.
- All the participation of the study was people, among them one is leader of the society and other are professional people, teacher, woman of the village.

### **Definition of the Key Terms**

**Muslims:** Muslims are people residing in Nepal who follow the religion of Islam.

**Ethnic Group.** An Ethnic Group is a grouping of people who identity with each other on the basis of shared attributes that distinguish them from other group such as a common set of tradition ancestry, language, history, society, culture, nation, religion or social treatment with in there residing area.

**Ethnography.** Ethnography is in-depth study of natural occurring behavior within a cultural of Muslim people for describing, analyzing and interpreting a culture-sharing group's pattern of behavior.

**Culture:** Culture is a set of activities to be performed by the Muslim people.

**Practices:** Systematic use of and idea belief and method by Muslim people in their cultural artifact.

## CHAPTER-II

### REVIEW OF RELATED LITERATURE AND THEORETICAL FRAMEWORK

Literature review is compact written summary of journal, articles, books and other document that portrays the past and current state of information on research topic which is going to be studied (Cerswell, 2014). It helps researchers to find out the gap in knowledge and adds validity and significance of the research. So this chapter encompass the empirical review, theoretical framework and conceptual framework.

#### **Empirical Literature**

Dahal (2010) Conducted a research on "A study on basic mathematical concepts and process of Magar community in Dhankuta district" with the aim to explore the basic mathematical concepts and processes of Magar community in Dhankuta district in order to foster a culturally pluralistic society. Especially the study focused on the practices of men and women of educationally disadvantaged ethnic community. The researcher selected Belaharu and Chumbang VDC's of Dhankuta district by purposive sampling method for the study area and only 8 respondents were taken for interview. Interview and observation were adopted as data collection methods. The major finding of this studied was Magar ethnic group use their own language to count the number. They have develop their own specific script for numerals. But in daily practices it is not used.

Lamichhane (2009) Studied on the title "Basic mathematical concepts and processes of Tamang community in Kavreplanchowk district" with the objectives of finding the counting system, to identify the basic mathematical operation used by Tamang system, to identify the basic mathematical operations used by Tamang community and measurement system practiced by them. This was a case study. 16 person were selected as a sample with the purposive sampling method. He used interview and observation for data collection. In the study he found that numeration system of Tamang is base 20, to add two numbers together, they use counting on method, to subtraction the number they counting back method, to multiple number, they add times of number by repetitive technique of addition.

D' Ambrasio (1984, 1985) father of the ethno mathematic has used the express "ethno-mathematics" refers to the form of mathematics that was a consequences of having embedded. In cultural activities whose purpose in other than "doing mathematics" on everyday activities such as building house, exchanging money, weighting product, valuation and precise geometrical pattern. These applications of mathematics often look different form those used in school today.

Adhikari (2009) Has done the research entitled "Ethno mathematical studies on the Heritage of Tharu" submitted to T.U. as an M.Phil. thesis also reveals the potentiality on the field of ethno-mathematics. It is a fresh attempt made at searching

Tharu's mathematical knowledge ideas. He found that cultural and traditional concept practicing by Tharu community special in geometry.

Bam (2010) Conducted a research on the topic "Problem faced by the DangaraTharu in learning mathematics". The main objective of this study was problem faced by Tharu students at secondary level in Kailali district. Altogether she found that participation of Tharu students have very poor so Tharu students have a lot of problem in learning mathematics such as: Speech problems, understanding problem, environment problem, economic problem etc.

Millroy (1992) conducted an international research "an ethnographic study of the mathematics ideas of group of carpenters". He conducted a six month ethnography study as an apparent carpenter in cape Town South Africa to document the valid mathematical ideas that are embedded in the everyday wood working activation of group of a carpenter. The second objective was to examine and to give a firsthand account of the teaching learning of mathematical ideas in the context of researcher apprentice.

Chaudhary (2017) Conducted a research on "Mathematical practices in Tharu community" with the aim to find out the mathematics concept and practices in Tharu community. The design of this study was qualitative with ethnography approach. He used purposive sampling to select the sample. 7 Tharu people were sample of this study. Observation and interview are taken as data collection tools. The major finding of this studies are the concept of rectangular and square shape is a common practice among the Tharu. The parallel line and triangular are also dealt.

Chapagain (2011) also did a research on a study of mathematics achievement of Muslim students in Rupandehi district. He conducted that only up to 35% of Muslim students participate in school and they do a little interaction at classroom and a few participation of extra activities in mathematics. So, their achievement is lower than other students.

Malete (1990) Completed the Ph. D. on "Challenging students through mathematics A culturally Relevant Problem solving" He raised the research questions.

What are the student's concepts of mathematics when posed with culturally relevant problem? Using any language of their choice from, can students participation of their thinking help us understand their learning process. What can we learn about students mathematical understanding when students are provide an opportunity to solve culturally relevant problem using their own thinking? To deal the above research questions, he used participatory action research design and research tools where class observation, participants, journals and transcripts of audio taped interview. By this , research, he found that the belief system held by the teachers about mathematics in overflowing into students. Conceptual mathematics began? To emerge as soon as we started solving culturally relevant problems. The relevant that the participants are able to use their own strategies to same to some success. They adjusted these when the

need arose and they made reflection. These strategies helped them given their own meaning of the problem. The achievement by the struggling students is possible instructions that encourages culturally relevant problem solving led. the students to use their own individual strategies. Teachers must developed an effective strategy of Communication.

Bourdieu (1998). Argues in "Reproduction in education, society and culture" that students who are from power and privileged class doubles their knowledge in the school activities, although they get some exposure in the learning. In other words the privileged class students easily decode or internalized message delivered in the class room. The states the higher the social class of the family the closer the culture it transmits is to the dominate culture and greater the attendant academic rewards. The children who learn to learn in on culture i.e. home May Face difficulties Procedures, teaching styles of teachers Class Room activities and encounters with different unknown person has be difficult to children that might create confusion for them this indicates that the particular class should be identified for the learners.

### **Research Gap**

From the above discussion of related literature, very few studies have been carried out around the field of ethno-mathematics. Among these practices, some were directly related to learning strategies of mathematical concept of different ethnic group. But this study tried to find mathematical knowledge practices in Muslim community and also explore the relation of Muslim cultural mathematical practice to primary level mathematical knowledge. Because any related research does not try to explore the mathematical knowledge practices in Muslim community and the relation of school mathematical knowledge. I argue that culturally relevant mathematics teaching builds the meaningful bridge between students home culture and school mathematics.

### **Theoretical Literature**

The researcher dealt with the theoretical discussion, which was relevant for the research and the interpretation of the research. There are so many theories related to my topic of study. The followings theoretical bases were considered for studying this research.

### **Social Constructivism**

This study is based on Vygotsky's social constructivist perspective because social constructivism claim that knowledge is actively constructed by students not only passively receiver. While they are making construction and analyzing figures

instead of knowledge being passively receiver and accepted. Every knowledge in socially constructed and children learn when we got interest with outer environment either verbally of observantly Vygotsky theory is one of them that regard social interaction between peers and adults an important aspect in creating meaning making

sense and conveying culture within the context. Knowledge is being unconstructed in social situation of negotiation rather than being the reflection of the objective reality which is termed as social constructivism. Social constructivism believes in the multiple constructions of the world. In social constructivist theory each human being makes sense of the world in a unique way. Vygotsky argues that the child's development cannot be understood by studying the individual; it needs to examine the external world.

According to social constructivist Vygotsky, knowledge is constructed in two ways in the social context. Firstly, social interaction influences the nature of knowledge that is constructed and the process of individual use of unconstructed knowledge. Thus, the constructions are socially centered as in value. The process of understanding and constructing knowledge for children to gain knowledge is a process of observing, reflecting, thinking, performing, practicing, and creating.

The research is based on social constructivism, a branch of constructivism. Muslims have lived with their culture and environment. According to social constructivism, people gain knowledge from their environment. So Muslims also gain knowledge from their interaction with social, cultural, and environmental factors. They have to fulfill their needs and expectations from their community.

### **Ethno-mathematics**

Ethno-mathematics is the study of mathematics that takes into consideration the culture in which mathematics arises. Ethno-mathematicians attempt to describe and understand the mathematical world as others see it, to give mathematics a more global perspective. All peoples use mathematics in their daily life, not just academic mathematicians.

The term ethno describes "all of the ingredients that make up the culture and identities of a group: language, codes, values, jargon, beliefs, food, dress, habits, and physical traits." Mathematics expresses a "broad view of mathematics which includes ciphering, arithmetic, classifying, or deferring, inferring, and modeling" (D' Ambrosio 2001, p. 308). Ethno-mathematics is important for today's world because it helps to connect school curriculum with children's cultural environments and reality. It helps to increase students' active participation in the mathematics classroom. Ethno-mathematics is related to the development of students' competencies, abilities, and skills through the study of mathematical ideas, procedures, and practices.

The research is based on ethno-mathematics' perspective that helps to relatively study the culture and mathematics and shows that the relationship between academic mathematics and cultural practices in mathematics. It helps to promote local knowledge of community members and links with school mathematics.

## **Cultural Discontinuity**

In the cultural discontinuity Theory, Ogbu (2000) deals with the problem, in children's learning Caused by the difference and discontinuity between the cultural at home school. He says that those children whose home culture's much similar to the culture of school can cope easily with the system that may result better learning achievement. Similarly, the children with unmatched and dissimilar home cultures with school culture do not have enough attention in their learning and do not get much recognition of their culture and they have to work achieving learning outcomes. Compared to the children with good matched. Ogbu emphasized learning not only the product of the culture and language difference but the relation between the culture and language of minority disadvantaged and dominate group. Controls the school system through implementing curriculum and using language as the only means of instructions.

Ogbu (2001) has emphasized on two types of cultural differences i.e. the primary cultural difference of the secondary culture differences of involuntary minorities. His study suggests, involuntary minorities face more difficulties in school learning, participation and performance due to big gap between their culture and mainstream culture. For them, it is to difficult to cross culture boundaries in school compared to the voluntary minorities with the primary difference. He further elaborated that primary culture difference may create problems in interpersonal and inter groups relations as well as difficulties in academic work for Several reasons. Among them, must important reason as children with different cultural backgrounds start schooling assuming different cultural world and human relations in school but get a vast difference reality in school. Next lack of necessary concepts and skills own cultures may obstacle their learning. Finally differences in teachings style and learning in strategies may be important reason that affects their learning.

This theory is based on John U. Ogbu cultural discontinuity is conceptually defined as a school-based behavioral process where the cultural value-based learning preferences and practices of many ethnic minority students those typically originating from home or parental socialization activities are discontinued at school. Mathematically cultural discontinuity is conceptualized as the difference ethnic minority students' cultural value-based behaviors exhibited at home and those exhibited at school. As is shown later, cultural discontinuity is evidenced by the relative difference between cultural value-based behaviors exhibited at home and those exhibited at school. According to this theory many ethnic minority students must discontinue their cultural value based behaviour in school to optimize their psychological well being and overall schooling experiences. Although Ogbu (1982) suggested that all students experience home-school discontinuities through their schooling experience such discrepancies are considered more pronounced for ethnic minority students.

Cultural discontinuity theory claim that some groups do well in school because their culture are congruent with school culture. Thus, frequently poor school performance of some minority group, immigrant and lower class children. The major

### Conceptual Framework of the Study

A conceptual framework is the representation either graphically or narrative from of the main concepts of the study. The Conceptual frame work devised through the literature studies facilitated to attain research objectives, get the answer of the research questions and carry out the research work as a whole smoothly Acharya (2015). Analyzing Varies literatures in relations to Geometrical knowledge Practices in different ethnic group.

I have developed a conceptual framework for the study, which is given below.

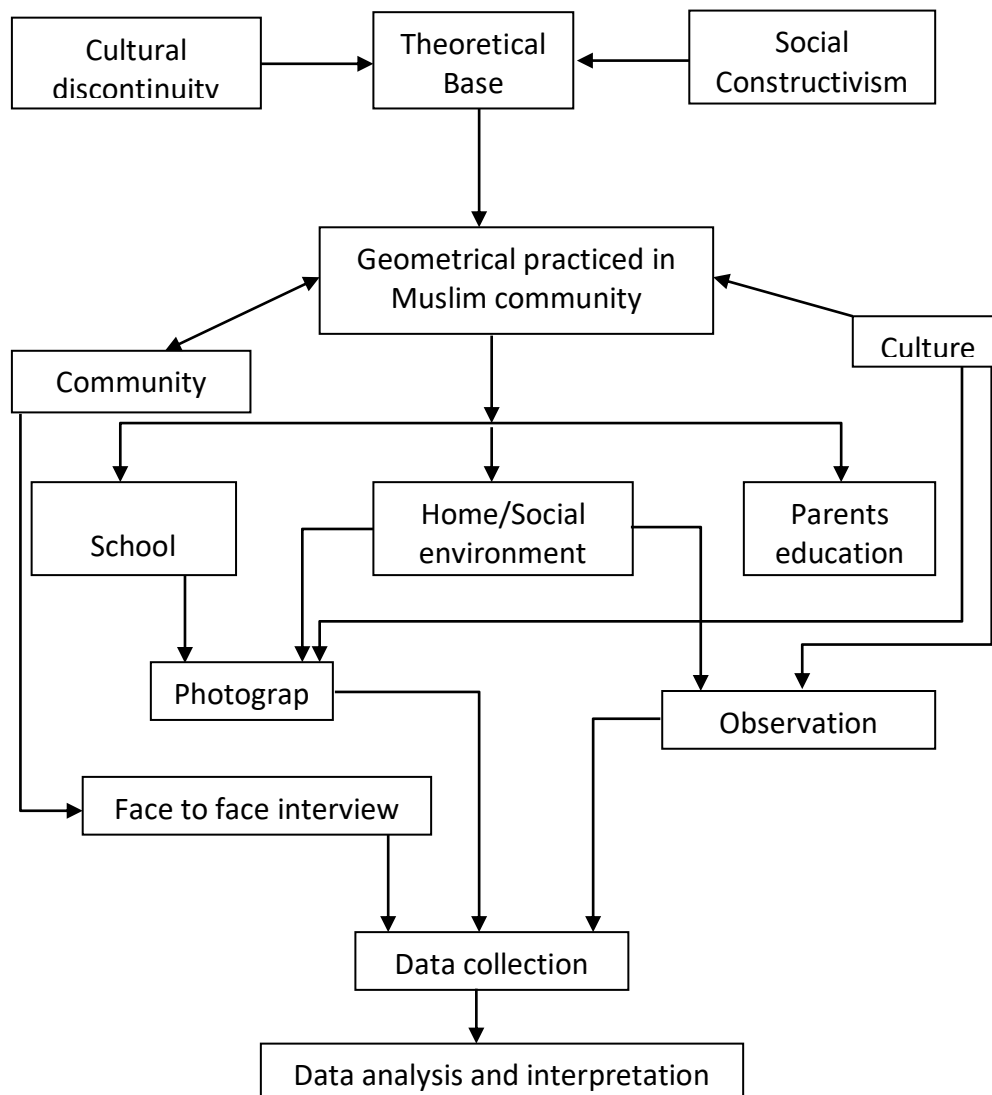


Figure No: 2

Source: Chaudhary (2017)

The conceptual framework, which I mention in above is prepared by the help of Chaudhary (2017). This study show the geometrical concepts practice in Muslim communities was issues of this study. I have applied the qualitative research design and ethnography approach for carrying out this study different theories, cultural discontinuity, social constructivist theory and ethno mathematics has used to interpret the data. There many cultural activities which effects on learning mathematics, cultural artifacts plays the key role in children learning geometry. Similarly, the cultural of elite, middle and low class people and school culture can directly effects on learning mathematics culturally.

This study has centered to explore the relation between culture and mathematics. The theoretical base of my research depends upon the social constructivism and cultural discontinuity. Social constructivism focuses on importance of the culture and constructing knowledge practices based on understanding. My research is systematic, qualitative procedure used to generate a theory that explain conceptual level process and interaction, school and home environment, parent education.



## CHAPTER-III

### METHODS AND PROCEDURES

Methodology is a powerful means for carrying out any investigation successfully. Methods refer to techniques and procedures used in process of data gathering. Methods is an essential means for research because without used of appropriate methods, finding of our research is meaningless, so methods play the vital role in research for any topic. The main components of the research methods are listed as research paradigm, research design, study site, sample of the study, data collection tools, data collection procedures and data analysis procedures

#### **Research Paradigm**

The research paradigm of my research is interpretive. Interpretive research paradigm influenced strongly by anthropology which aim to understand other cultures, from the inside (Tylor and Medina, 2011). It is focused on the social study of humanity. Interpretive research seeks the deep understanding about human culture. To gain the deep understanding about human culture, researcher spends considerable time in the field. Researcher sees the world through participant's eyes: Understand their feeling emotion, behaviour, pain and pleasure. It is based on the assumption that social reality is not singular or objective, but is rather shaped by human experiences and social contexts and is therefore best studied with its socio-historic context by reconciling the subjective interpretations of its various participants Handcock, B. (2002). Because interpretive research view social really as being embedded within and impossible to subtract from their social settings.

The main purpose of my study was to gain the deep understanding about the mathematics practices in ethnic group Muslim community. Therefore, this research paradigm was most appropriated for my study, I have used interpretive research paradigm to explore how the everyday practices, cultural artifact, ornaments, rituals and related with mathematics in ethnics group of Muslim community and how we can link their mathematical practices in teaching learning activities.

#### **Research Design**

The research designed of my study is qualitative with ethnographic approach. Where ethnography is the in-depth study of human culture. Ethnographic designs are qualitative research procedure for describing, analyzing and interpreting a culture, sharing group's shared patterns of behavior, beliefs and language that develop overtime. Ethnographic, Simply sated, is the study of people in their own environment through the use of method such as participation observation and face to face interviewing(Khanal, P. 2063 P. 139.)The researcher tries to explore the mathematical concepts specially in geometrical knowledge of own traditional equipment practices in Muslim ethnic group. This study lays in the observation of natural behaviour occur in a real life setting, free form the constraints of more conventional research

producers. It mentioned the objective of the purposed study and to make a good and systematically. The result of the study had done on the basis of the case study design because the study focused on the explore the mathematical ideas of Muslims community at Kapilvastu district.

### **Study Site**

Muslims people are mainly found in surrounding terai region. Among them, Kapilvastu is also know as local residence of Muslim people. There we still can find the cultural heritage of Muslim. So my research site is Banganga municipality of Kapilvastu district. My intention for this study is to find out the mathematical practices in Muslim community.

### **Sample of the Study**

This research is ethnographic case study, so the sample size in this study is not fixed. There are no rules for sample size in qualitative inquiry(Anderson, G. 1998, P. 192). So, the sample size of this inquiry depends upon the research what want to know, what are the purpose of inquiry, what can be credibility of the study and what can be done with available time and resources. In order to, obtain information about mathematical concept and practicing among Muslim community and their use in teaching learning activities. For this purpose, I had selected four parents, four students and three mathematics Muslim teacher purposively from Banganga municipality, Kapilvastu district.

### **Tools for Data Collection**

There are different tools for collecting primary and secondary data. I have collect secondary data from different journal, articles, books and other published and unpublished documents. I had collected primary data from taken interview, observation and photograph. The research tools are described below briefly.

### **Observation**

Observation is an importance techniques to gather information. It is the most useful tool for the data collection for the qualitative research. It concerns the recording of what is being observed. In this research, I use memo writing for the observation tools. At first, I had met the senior person of the Muslim community and I have given information about my study area and purpose of the study. After given information from them, I visited at Banganga municipality. I took some information about the environment, culture, customs, profession and economic condition of the community by the help of senior person. I observed their daily life activities like playing, agriculture, life style houses hand, customs, cattle management construction and other specific activities Inoted information on my notebook. I observed about mathematical concept counting system, measuring system and geometrical knowledge own their traditional equipment.

## **Interview**

Interview is one of the essential methods to collect primary data for the qualitative research design. Interview is a data collection procedure involving verbal communication between the researcher and respondents either by telephone or in a face to face situation. For this, I prepared interview schedule on the basis of semi-structured interview, when I reached the study area I met the Muslim people individually by the help of other persons. First of all, I made good relationship with them and them. Then, I took interview with selected person on the basis of interview schedule. The questionnaire changed according to the interview's responses and situation. I listed carefully the interview is answer the observed their special expressions and the tone of their voices. The interview had taken to collect data about mathematical concept and practicing, counting system, measuring system and geometrical knowledge of their own traditional equipments.

## **Photographs**

Photographs are important tool for primary data collection. I took some photograph of Muslims activities. Especially milling material , grain store martial, refine material and sleep and sit material use in their daily activities.

## **Data Collection Procedure**

During the data collection period, I visited the area after selecting the title of proposal. It has not easy for me because the social environment is new for me. Therefore, I needed to adjustment few time with people I hope that sample of the study more accessible and people are more helpful. Then, I had discussed with the Muslims leaders, farmers, senior adults, teachers and students. I also visited their work place house farms, masjid etc. For detail information. At that time, I took some photo and made field note. I collected data by participate, observation interview.

## **Data Analysis Approach**

Analysis of data means studying the organized materials in order to discover the inherent facts. Regarding data analysis and interpretation, I translated audio visual and recorded data in written form and categorize and encode the information what is actually intend to explore from these data. While interpreting the data, I created the rich environment of the field and expressed reality as far s possible.

My research is interpretive so that I reflected my personal experience in the fields, I also interpret participant's behavior, activities, culture in reflective way. The collected information from the class observation, interview and community categorized according to category of data and using thematic and triangulation method for data analysis. Finally, I analyzed the data by link with different theories and literatures described in the literature review section.

## CHAPTER - IV

### ANALYSIS AND INTERPRETATION OF DATA

This chapter deals with the analysis and interpretation of the collected information from the ethnographic. During the study the researcher conduct different observation of object, interview with teacher and students, study of related document and participation observation was done every day in Muslim communities activities and their cultural and social value about one years. The researcher explore a Geometrical concepts practice in Muslim community. The researcher collected the data interpretation and analysis of data obtained by the research through observation, interaction and study of related document. The collected information where analyzed and discussed under the following heading. In this chapter, I devoted to analysis and interpretation of the data related to my topic "Mathematical practices in Muslim community and their relation to the primary level mathematics". I spent considerable time in the field to fulfill my thesis purpose. Especially I observed their daily activities such as cultural artifacts, basketry, clay works, wooden and bamboos works.

#### **Geometry is Cultural Artifacts**

From December 31, 2019 I started my field work from Banganga-8 Siseni Kapilvastu, my first observation was Dhiki, which is a tradition Nepal is rise mill use in a Muslim community. My next observation was Jato. It is a grinder machine made of special stones that are still been using in Muslim community. Similarly I was respectively observed Charpai, Nango, Bhakari, Dehary, Sukul and Woolen Carpet. which is made by Muslim women. It is a beautiful pattern of rectangle and next I took some photos of cultural artifacts. I discussed them detail in the below. I have completed 6 months by observing some cultural artifacts which are directly or indirectly related to mathematics.

#### **Materials Used for Milling**

#### **Geometrical Concepts in Dhiki**

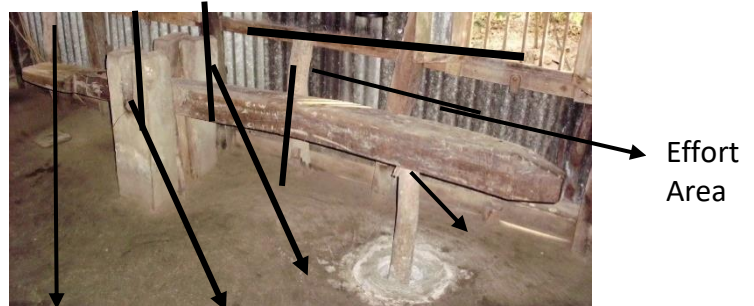
Dhiki is traditional Nepalese rice, millet, wheat etc. beater used in Muslims community and other communities as the manual wooden thresher. Dhiki is made of wood and work like a liver but which is used instead of grinding it is use for of long time. Dhiki is a one kind of traditional tool. It is a local technology used in Nepali villages.

The respondents said *"Not everyone who lives in our community has a Dhiki in their house but there is a Dhiki in every toll. All the habitants use it together."*

This show that everyone used Dhiki. The framework consists of a fulcrum having two pillars on each side and effort area where one person stands on the long thick plank of wood making effort at every interval. It is long and thick plank which is

horizontal wood and has a small vertical extension that goes into a hole made in the ground, in this hole the grains or dry chilies are kept to transform them into powder. The person using this usually places his or her leg on one side and press it hard and then leave it. So that the other part hits the Rice, Millet, Wheat etc. and grinds it. It works like the seesaw that is when one part is up the other one is down and vice-versa. The geometrical concepts found in Dhiki are, Effort area

- Parallel lines
- Perpendicular lines
- Right angle
- Ratio
- Function



Hit area      Parallel line      Perpendicular

Figure No. 4.1

The geometrical concept of the Dhiki mentioned above is explained and analyzed in detail in the topic given below.

### **Relation of Dhiki to Primary Level Mathematical Knowledge**

The above mention mathematical concept are clearly seen in Dhiki. Two poles appear to be parallel. There is a fixed (constant) ratio between hit area and effort area of Dhiki. The long wood and mouth are perpendicular to each other. There is a right angle between long wood and mouth. If we input paddy in the Dhiki then the rice is output, so it works like a function.

Taking an interview with students 'A', he said " *I have a Dhiki in my house, my father and mother thresh rice and wheat in its. But I don't have a information about what geometrical concepts are use in Dhiki.* "

Students 'B' said "*I don't have a Dhiki in my house but my neighbor has a Dhiki. I was surprised to here that geometrical concepts are also used in Dhiki.*"

Students 'C' Said :"*The teacher didn't tech that there are geometrical concepts in Dhiki when teaching in the class room. It has have been easier for me to understand mathematical concepts, if I had shown the material at the local level while teaching.*"

The research concluded that the above voice of students, all the students have seen the Dhiki and it has used in their house. The teacher isn't using locally available metrical while teaching. The students were very curious to hear that mathematical

concepts are used in the object at the local level. So the Dhiki can be considered as a very useful educational material for primary level mathematics teachings. It can be a very useful educational tool to teach basic cognitive concepts to primary level children. We can give the concept of parallel line by showing the position of two poles. We can also be asked to the students to find the relationship between the length of the hit area and the length of the effort area as well as the ratio of the hit area and the effort area. From the Dhiki we can also teach the students about the concepts of perpendicular line by taking an example of long wood and mouth of Dhiki. Looking at the structure of the Dhiki, it has found clear geometrical perceptions seem to be used in parallel line, perpendicular line and function. So we can clearly see to the geometrical concept used in Dhiki. Therefore, the teaching learning process is effective, sustainable and simple when the teacher presents an example of Dhiki for teaching perpendicular line, parallel line and function. However, in the interview with the teacher during the research.

The teacher said "*I do not use Dhiki to teach mathematics for primary level. Also I did not teach mathematical subject along with the material used in daily life in society*".

Although Ogbu (1982) suggested that all students experience home school discontinuities through their schooling experience such discrepancies are considered more pronounced for ethnic minority students. Some groups do well in school because their culture are congruent with school culture. Therefore, in order to learn each subject we should be taught in conjunctions with socio-cultural activities.

### **Geometrical Concepts in Jato**

Jato generally rotate from anticlockwise. There is a mani in the middle of the lower part of Jato. While fixing a mani, first of all we need to make a hole in the middle of lower part of Jato. Then a half part of small piece of iron is buried in the hole attaching with a piece of wood which is called mani. The stone of lower part of Jato is buried up to 1 inch below from the surface level of land. Jato is a grinding machine made of special stones that are still being used in Nepal.

The respondents said "*A stone grinder machine which is made of stone, it is used by hand to grind such as Pulses, Lentils, Peas, Maize, Gram, Wheat and other grains.*" Normally, a person is enough to operate it. It can be found whether in the Tarai region or Himalayan region of Nepal. Especially, rural area in a current situation.

Basically, it consists of two round curved stones, the bottom part is attached to the floor in the house where another part is placed on top of the bottom flat stone. The bottom stone has a big wooden nail in the center which supports the top part. However, the top part has two holes one is the center where big wooden nails insert while placing and the other one the side of the top flat stone where the small wooden nail is placed. While grinding the things people grind the small wooden nails to roll

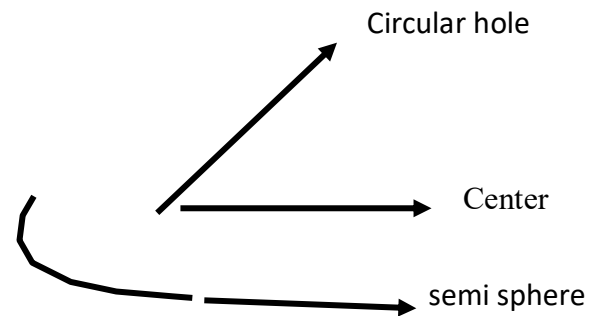


Figure No. 4.2

and move the top flat stone in a clockwise direction or anti-clockwise direction to grind the grains. The geometrical concepts found in Jato are

- concepts of center
- concepts of semi sphere
- concepts of function
- concepts rotation

The above mention mathematical concept are clearly seen in Jato with out any formal education Muslim Community have a concepts of mathematics. The geometrical concept of the Jato mentioned above is explained and analyzed in detail in the topic given below.

### **Relation of Jato to the Primary Level Mathematical Knowledge**

The Jato is related to the mathematical knowledge of the primary level. With the help of Jato we can be taught the basic concepts of hemisphere, center, rotation at the primary level and we can be taught basic concepts function in the upper level.

Taking an interview with students 'A', he said " *I have a Jato in my house, my father and mother grind pulses, Lentil, Peas, Maize, Germ, Wheat and other grains in its. But I don't have a information about what geometrical concepts are use in Jato.*"

Students 'B' said " *I don't have a Jato in my house but my neighbor has a Jato .I was surprised to here that geometrical concepts are also used in Jato.*"

Students 'C' Said : " *The teacher didn't tech that there are geometrical concepts in Jato when teaching in the class room. It has have been easier for me to understand mathematical concepts, if I had shown the material at the local level while teaching.*"

The research concluded that the above voice of students, all the students has seen the Dhiki and it has used in their house. The teacher isn't using locally available

metrical while teaching. The students were very curious to hear that mathematical concepts are used in the object at the local level. In the context of primary level mathematical content Jato is used to give many mathematical concepts such as circular shape where two round curved stones are in circular shape and the bottom stone has a big wooden nail in the center which gives the concept of center of the circle to the students. By the concept of Jato we can say that students draw the circle with the help of a compass and note the center, radius and circumference of the circle. We can take a Jato as one of the appropriate examples of function teaching. Where Jato is a grinder machine if we put rice in the machine the output is flour, so Jato is one of the important tools for teaching mathematics. The strong relationship between Jato and Primary level mathematics is given as follows.

### Materials Used for Food Storage

#### Geometrical Concepts in Deheri

The Deheri is a traditional storage vessel made from a mixture of clay, ash, straw and plant fiber, among other natural materials. It comes in different shapes and sizes and in this particular house, it fulfills, among other things, the role a well has in most other dwellings. Deheris are composed of two- or three-layer rings either quadrangular or circular in shape, depending on the size of the structure and have a narrow mouth. This narrow opening is sealed with a lid, and it is through a small hole in the lid that the respondents said "I used to use Deheri to store breads of paddy like the Andi, Ramdhan and Radhachar".

These grains have been stored for agricultural use when the planting season arrived. Grains such as mustard, legumes, wheat and rice, which the family consumes every day, are stored in the remaining vessels. Muslims live in Kapilvastu, Banganga-4, Siseni Village but the practice of using Deheri for storage is not limited to their area. Deheris are in fact, one of the most cost-effective and innovative means of storing grains (for all purposes). A majority of the ethnic Muslim community and Tharu communities living in the Tarai, particularly in the plains of the country's far and mid-western regions use these vessels. These tall mud containers are often the only option for farmers who cannot afford other forms of storage and are also said to have biological anti-rodent and anti-pest abilities and eliminate the need to use residual insecticides or fumigants.

The concept of volume and the concept of identity

function found in Deheri.

Mathematical concepts are clearly used in

the construction of the Deheri. It is used mainly

for grain storage. Therefore, when making

a Deheri it is made in the same size as the



Fig.No.4.3



the vessels posterior that the stored grain is accessed. result of keeping the grain in it. Therefore, it is found that the concept of volume is used in it. The geometrical concept of the Dhiki mentioned above is explained and analyzed in detail in the topic given below.

### **Relation of Deheri to the Primary Level Mathematical Knowledge**

The Deheri is related to the mathematical knowledge of the primary level. With the help of Deheri we can be taught the basic concepts of volume at the primary level and it can be used taught to primary level and it can be used taught to primary school children to clarify their confusion between area and volume. So we can say Deheri is one of the appropriate tools of teaching mathematics.

Taking an interview with students 'A', he said " *I have a Deheri in my house, my father ,mother And brother Store paddy in it can stored 4 Muri paddy in it . But I don't have a information about what geometrical concepts are use in Deheri.*"

Students 'B' said " *I don't have a Deherii in my house but my neighbor has a Jato .I was surprised to here that geometrical concepts are also used in Deheri.*"

Students 'C' Said :" *The teacher didn't tech that there are geometrical concepts in Deheri when teaching in the class room. It has have been easier for me to understand mathematical concepts, if I had shown the material at the local level while teaching.*"

The research concluded that the above voice of students, all the students have seen the Deheri and it has used in their house. The teacher isn't using locally available metrical while teaching. The students were very curious to hear that mathematical concepts are used in the object at the local level.

Deheri can be used taught to primary school children to clarify there perception about volume. We can asked the students how much paddy can you put in your Deheri ?1 muri, 2 muri, 3 muri. How much paddy can be stored in your Deheri that is called the volume of your Deheri. Because Deheri is a household object found in the home of every Muslim community in the Tarai. In this way teaching is effective by showing and observing the material that the students has seen and used.

In the cultural this discontinuity theory, Ogbu (2000) "Deals with the problem in the children is learning caused by the different and discontinuity between the culture at home and school. He says that those children whose home culture is much similar to the culture of school can cope easily with the system that may result better learning achievement. Otherwise learning is not better".

However, in the interview with the teacher, the teacher said "*I do not used the teaching material available in local level*". The students said, "*the teacher do not used any teaching materials during the teaching*".

The above mentioned responses of the students guardians and teacher where indicates that are many geometrical concept in the object used at the local level but they were not found to be used in class room teaching.

### Geometrical Concepts in Bhakari

The Bhakari is a traditional storage vessel made from a bamboo. It is found in cylindrical shape. Farmers is used Bhakari for storing food grains for their own need. These traditional stored system could be applied in minor modification. It is found in the home of Nepalese farmers.

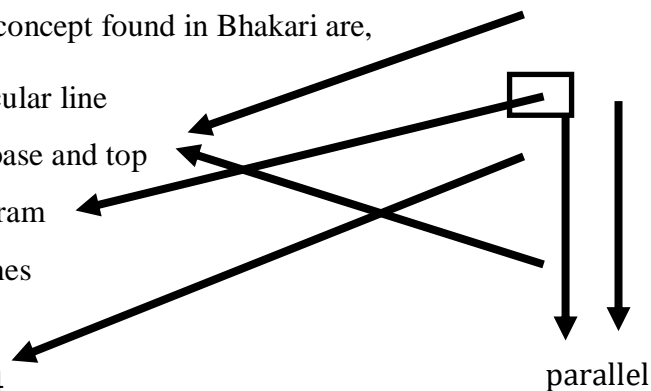
Bhakari is a tradition object used in Muslim community for different purpose.

The respondents said *"I used Bhakari for storing paddy , corn, milt. it's a cylindrical shape."* Bhakari is used for storing paddy, corn, millet. is made from small pieces of bamboo in the shape of cylinder. This is made from Specially agriculture purpose. At first, they used the process of parallel line, perpendicular line and rectangle and they folds circularly to construct it.

The Geometrical concept found in Bhakari are,

- Perpendicular line
- Circular base and top
- Parallelogram
- Parallel lines
- Cylinder

Fig.No.4.4



We can see circular hole in top and base side of this object. This object is considered as of perfect example to make clear the concept of cylinder, Its area and volume. The concept of parallel line and perpendicular line also we can taught. If we used object to teach the concept of students can cylinder can understand easily.

### Relation of Bhakari to the Primary Level Mathematical Knowledge

The Bhakari is related to the mathematical knowledge of the primary level. With the help of Bhakari we can be taught the basic concept of cylinder, Its area and volume. The concept of parallel line and perpendicular line also we can taught. If we used object to teach the concept of students cylinder can understand easily.

Taking an interview with students 'A', he said *" I have a Bhakariin my house, my father, mother And brother Store paddy in it. We can stored 4 muri paddy in it . But I don't have a information about what geometrical concepts are use in Bhakari."*

Students 'B' said " *I don't have a Bhakari in my house but my neighbor has a Bhakari. I was surprised to hear that geometrical concepts are also used in Bhakari.*"

Students 'C' Said : " *The teacher didn't teach that there are geometrical concepts in Bhakari when teaching in the class room. It has been easier for me to understand mathematical concepts, if I had shown the material at the local level while teaching.*"

The research concluded that the above voice of students, all the students have seen the Bhakari and it has used in their house. The teacher isn't using locally available material while teaching. The students were very curious to hear that mathematical concepts are used in the object at the local level. With the help of Bhakari we can give the concept of parallel lines, cylinder, circle and the volume of cylinder to the primary level children. The base of Bhakari is circular that is Bhakari is the one of the most proper example of cylinder. Since students remember what they saw faster than what the teacher said. The teaching learning process is sustainable, meaningful, effective and simple if we observed Bhakari while teaching primary school children about cylinders. Students are also attracted to teaching learning activities when teaching by showing real object. However in an interview with a math teacher during the research he said " *I do not know about the geometrical concept exists in Bhakari. So I did not use the Bhakari in teaching cylinder. I only used the educational materials provided by the school administration.*" The above information shows that the teachers have lack of practical knowledge of mathematics because the Ogbu (2000), argues that those children whose home culture is much similar to culture of school can cope easily with the system that may result in better learning achievement. So that we need to connect students' home material (Bhakari) in teaching learning activities because Bhakari is a cultural object of the Muslim community that is the Muslim students see Bhakari at his/her home. Finally the data which were obtained during the research were analyzed and interpreted. There are many geometrical concepts in the local level mathematics but they were not found to be used in classroom teaching.

### **Material Used for Carry Object**

#### **Geometrical Concepts in Doko**

Doko is a common artifact that we could see in the Muslim community. Doko is a kind of basket made by bamboo. Doko are usually in V shape but there is a square shape in base. We find different sizes of Dokos. Doko are specially used to carry grass, firewood etc.

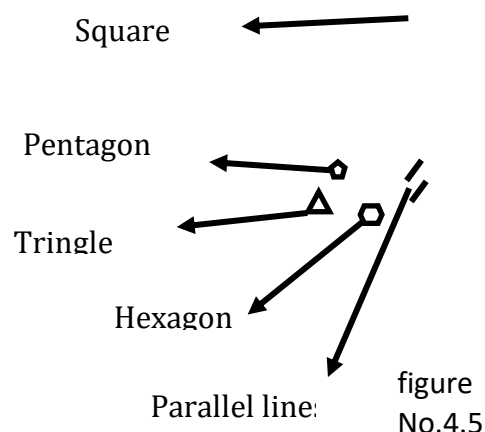
The respondents 'A' said " *I know how to weave Doko, it is woven from bamboo. It dries up and blows up.*"

The respondents 'B' said " *I used Doko for carrying grass and it is in 'V' shape.*" Doko is a local handicraft object which is made up of bamboo. Doko is used to carry

items such as grains, grasses, even filled water pots. It is also used to carry patients to go to hospital all kids to school. in Banganga municipality, even nowadays it can be seen using in building areas carrying bricks, small stones and sands.

The Geometrical concepts found in Doko are,

- Parallel lines
- Triangle
- Pentagon
- Hexagon
- Square



A single Doko Carries several Geometrical shape. It is a combination of art and mathematical real concept that can be living context in the class room teaching of lines, curves, triangle parallel lines, hexagons and polygon. We can see that some triangles hexagon [Each angle  $\frac{(n-2) \times 180^\circ}{n}$  and sum of total interior angle

$(n - 2) \times 180^\circ$  straight lines, parallel lines, curves in shape. So it can be used to teach the concepts a straight parallel line, tringle, pentagon and hexagon at the school geometry if we consider it as a teaching objects.

### Relation of Doko to the Primary Level Mathematical Knowledge

The Dhoko is related to the mathematical knowledge of the primary level. With the help of Dhoko we can be taught the basic concept of square, parallel line. The concept of parallel line and perpendicular line also we can taught. If we used object to teach the concept of students parallel line can understand easily.

Taking an interview with students 'A', he said " *I have a Doko in my house, my father, mother And brother used it to carry object. It shape seem to be like cone , it has contain so many hole . But I don't have a information about what geometrical concepts are use in Doko.* "

Students 'B' said " *I don't have Dokoi in my house but my neighbor has a Doko. I was surprised to hear that geometrical concepts are also used in Doko.* "

Students 'C' Said: " *The teacher didn't tech that there are geometrical concepts in Doko when teaching in the class room. It has have been easier for me to understand mathematical concepts, if I had shown the material at the local level while teaching.* "

The research concluded that the above voice of students, all the students have seen the Doko and it has used in their house. The teacher isn't using locally available metrical

while teaching. The students were very curious to hear that mathematical concepts are used in the object at the local level. Doko is a local handicraft object which is made up of bamboo. A single Doko carries several geometrical shape. Show we can use Doko to given students a basic idea about parallel line, curve, straight line, triangle pentagon and hexagon at the primary level school geometry. If we used this object then the learning has effective sustainable and meaningful. However teachers said "*I do not information about the geometrical concept practice in Doko, so I did not used the doko in teaching mathematics*". Students also said "*The teacher did not used any teaching material available in local level*". However the D' Ambrosio (20001). Argue that " School curriculum with child cultural environment and reality it helps to students active participation in mathematics class room".

The above mention responses of the students, teacher and guardians where indicate that there are many geometrical concept in the objects use at to the local level what they were not found to be used in class room teaching.

### **Material Used for Refine.**

#### **Geometrical Concept in Theki and Madani**

They are used Theki and Madani for store milk fat, making butter out of it and they are also make buttered milk (Muhi) from it. They kept madani inside the Theki for milk fact. They slowly start to rotate the madni.

The respondents said "*I have a Thake in my house used to store milk, fat. making butter out of it and also it make a muhi. It seem to be cylindrical shape*".

This is locally made by the people from wood which is used to store milk fat, making butter out of it and also it make a buttered milk (muhi). The Theki is only of vessel, where as the Madani is like a thick stick with turbines at one end. All these product are made by keeping the " Theki and Madaninear a pillar so that Madani can be tied very loosely right parallel to the pillar. The Madani them need to be wrapped around spirally by another rope in such a manner that when you put outside the other gets smaller. The Madani is them kept inside the Theki with milk fat in it. Slowly the person starts to rotate the Madani. The Geometrical concept found in Theki and Madani are,

- Cylinder
- Parallel line
- Spinal
- Circle

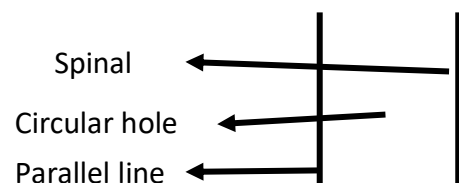


Fig.No.4.6

We can find the different types of basic geometrical concepts in this object the whole shape of this object is or cylinder. There is a circular hole to the mouth of Theki the Madani is parallel to the pillar. The Madani is wrapped around spirally by rope. So it can be used to teach the concept of cylinder, circle and parallels lines at school level geometry.

### **Relation of Theki and Madani to the Primary Level Mathematical Knowledge**

The Theki and Madani is related to the mathematical knowledge of the primary level. With the help of Theki and Madani we can be taught the basic concepts of cylinder, parallel line, circle spinal. There is a circular hole to the mouth of Theki the Madani is parallel to the pillar. The Madani is wrapped around spirally by rope. So it can be used to teach the concept of cylinder, circle and parallels lines at school level geometry.

Taking an interview with students 'A', he said " *I have a Tiek and Madanii in my house, my father, mother And brother used it to Store milk, fat making butter out of it . It shape seem to be like cone , it has contain so many hole . But I don't have a information about what geometrical concepts are use in Theki and Madani.*"

Students 'B' said " *I don't have Theki and Madani in my house but my neighbor has a Theki and Madani. I was surprised to hear that geometrical concepts are also used in Theki and Madani.*"

Students 'C' Said: " *The teacher didn't tech that there are geometrical concepts in Theki and Madani when teaching in the class room. It has have been easier for me to understand mathematical concepts, if I had shown the material at the local level while teaching.*"

The research concluded that the above voice of students, all the students have seen the Theki and Madani and it has used in their house. The teacher isn't using locally available metrical while teaching. The students were very curious to hear that mathematical concepts are used in the object at the local level.

By the help of Theki and Madani we can taught the basic concept of parallel line, circle, spiral and cylindrical shape to the primary level students. However taking and enter with teacher, he said " *I don not used any household material in teaching mathematics I have only done the exercise given in the textbook*".

The above information seen that the teacher in only depend on text book for teaching mathematics however Obue (2000) argue that "Those children whose home culture is much similar to the culture of school can cope easily with the system that may result better learning achievement. Similarly the children with on match and dissimilar home culture with school culture do not have enough attention in their learning".

The above mention responses of the students, teacher and guardians where indicate that there are many geometrical concept in the objects use at to the local level what they were not found to be used in class room teaching.

### Geometrical Concepts in Naglo (*Supalo*)

Nanglo is a flat round woven tray made up of bamboo. It is traditionally out of thin bamboo pices intermingled into a flat surface like ancient method of weaving cloth manually by tangling threads. It is used for sifting grain and used to separate dust particles from paddy, rice, dal beans and others cereas. Nanglo is used to make corn pure from the mixture of any other unwanted things. It is made from the bamboo. In Nanglo, we can see many different types of geometrical knowledge.

The respondents said " *I use nanglo to make corn pure from mixture of any other unpatented things wich is a circular shape.*" Most of the Muslim students see the nanglo used by their parents neighbours in daily life activities. But they did not interlink nanglo with geometrical knowledge. They only know Nanglo is daily life material. Also, the teacher doesn't used Nanglo as a material for teaching geometry in primary level. The Geometrical concepts found in Naglo are,

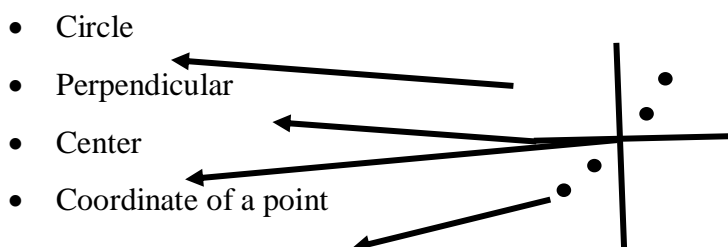


Fig. No. 4.7

In Naglo there are different types of geometrical concepts. The small pieces of bamboo are vertical and horizontal pieces of bamboo are perpendicular to each other. Some pieces make coordinate of a points where x-coordinate and y-coordinate are seen in Naglo. The whole Naglo is circular shape. Therefore this object help us to teach the basic concepts of circular perpendicular line, coordinate of x and y at the school level geometry class.

### Relation of Nanglo to the Primary Level Mathematics Knowledge

The Nanglo is related to mathematical knowledge of the primary level. With the helps of we can taught different geometrical shape. The whole Naglo is circular shape. Therefore this object help us to teach the basic concepts of circular perpendicular line, coordinate of x and y at the school level geometry class.

Taking an interview with students 'A', he said " *I have a Nanglo in my house, my mother used it for makin rice, dal, corn, pure from the mixture of any other unwanted things it . It shape seem to be like circle . But I don't have a information about what geometrical concepts are use in Nanglo*

Students 'B' said "*I don't have Nangloin my house but my neighbor has a Nanglo. I was surprised to hear that geometrical concepts are also used in Nanglo.*"

Students 'C' Said:" *The teacher didn't tech that there are geometrical concepts in Nanglo when teaching in the class room. It has have been easier for me to understand mathematical concepts, if I had shown the material at the local level while teaching.*"

The research concluded that the above voice of students, all the students have seen the Nanglo and it has used in their house. The teacher isn't using locally available metrical while teaching. The students were very curious to hear that mathematical concepts are used in the object at the local level.

Nanglo is a popular artifact in every rural Nepalese house not only in Muslim community. it is circular disk inside it there are various geometrical pattern and forms. It does not support only teaching simple geometrical of lines, angles, triangles, rectangle, it also support teaching co-ordinate geometry to the horizontal and vertical intersecting lines can be regarded as two perpendicular axis. The beautiful patterns form image around a fixed image a fixed line as a line of reflection. It also can be useful for teaching line symmetry and point symmetry. The Nanglo can be rotated about a fixed point at the center of origin and can be touched the concept of rotation in geometrics transformation. At the same time, It can be helpful to teach coordinate of a point. There are two sides of Nanglo. The picture given in the front or vertical side and the next one given in 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.

### **Material Used for Sit and Sleep.**

#### **Geometical in Galaicha**

Galaicha are handmade material. The Galaicha are woven on study frame looms in a vertical or sloping position. Irrespective of size, the main components of a loom are the same two movable beams, held in position by wooden blocks which are fixed to the rigid wooden frame, made from 8-10 cm thick. It is one of the Muslim handicraft material. Which is rectangular shape. This use of geometry is through to reflect the language universe and help the believe to reflect on life and the greatness to creation.

The respondents 'A' said " *I know how to weave Galaicha its woven woolen which is rectangular shape.*"



The respondents 'B' said " *In the middle parts of our Galaicha has different size of circle which seen to be spiritual meaning circle have no end point they are infinite and so we remain Allha is infinite*"

In the middle parts of Galaicha has different size of circle which seen to be spiritual meaning. They claim that the circle have no end they are infinite and so they remind Muslims that Allha is infinite. Complex geometry designs create the impression of unending repetition and this also help person get and idea of infinite nature of Allha. The Geometrical Concepts Found in Galaicha are,

- Rectangle
- Circle
- Cylinder
- Hexagon
- Square

Hexagon ←

Circle ←

Rectangle ←

Fig. No. 4.8

in Galaicha there are different types of geometrical concepts. The small pieces of wool are make and circle. In Galaicha we can see show many mathematical concept such as square, circal, rectangle and cylinder. If we role the Galaicha make a shape of cylinder.

### **The Relation of Galaicha to the Primary Level Mathematics Knowledge**

The Galaicha is related to the mathematical knowledge of the primary level. With the help of Galaicha we can be taught the basic concepts of rectangular, parallel line, circle .

Taking an interview with students 'A', he said " *I have a Galaicha in my house, my mother making it in beautiful pattern . It shape seem to be like rectangle . But I don't have a information about what geometrical concepts are use in Galaicha*

Students 'B' said " *I don't have Galaicha in my house but my neighbor has a Galaicha. I was surprised to hear that geometrical concepts are also used in Galaicha*"

Students 'C' Said:" *The teacher didn't tech that there are geometrical concepts in Galaicha when teaching in the class room. It has have been easier for me to understand mathematical concepts, if I had shown the material at the local level while teaching.*"

The research concluded that the above voice of students, all the students have seen the Galaicha and it has used in their house. The teacher isn't using locally available

metrical while teaching. The students were very curious to hear that mathematical concepts are used in the object at the local level.

Galaicha are a type of handcraft material made by the woman of the Muslim community. Galaicha seems to be used in every community. Galaicha made by the Muslim community in particular seem to be used different geometrical patterns. Therefore, we see to use the concept of circle, rectangle and square clearly in Galaicha. Even so we can use Galaicha to give students a basic idea about circle, rectangle and square in the course of primary mathematics teaching learning through which the teaching learning process can be effective, sustainable and meaningful. However, in an interview with a math teacher during the research, he said *"I do not know about the geometrical concept of Galaicha. So I did not use the Galaicha in teaching mathematics. I only used the educational material provided by the school administration. However educational materials available at the local level are not used outside the school, and they are not observed at the local level"*. The teacher should make the students as active as possible during the teaching. The students should be given the opportunity to learn by given various activities. The relationship between the class room activities and the activities in the society should be established during the learning. Then the learning has effective. However, during the observation of room and in the interaction with the student's culture, traditional, social activities and locally available materials. The mathematics existing in the local Community are found to be ignored.

### Geometrical Concepts in Chatai (Sukul)

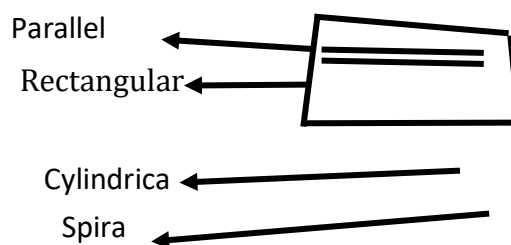
This type of mat are made out of paddy stalk locally called Chatai. The wrapped procedures are working for making the Gundri. The wrapping strand a rope. In this case passes round the bundle of paddy stalk passing, Over two and under one bundle. This process is continued until the desired length is achieved after which the rope is tied into a knot and passes between the last bundle at a short distance and the process is continued.

The respondents said *" I know how to weave Chataia its woven paral which is rectangular shape."*

Therefore, a Chatai is wrapped at distance of about 30-35 cm throughout its breadth to ensure that it is tight enough and the stalk do not being to come off after sometime. The process of wrapping is completed if the sides are finished. Apart from sitting this mat used as a mattress in winter. For sleeping because it provided heat.

The geometrical concepts found in chatai are,

- Parallel line
- Rectangle



- Cylinder
- Spiral

Fig. No.4.9

The geometrical concept of the chatai mentioned above is explained and analyzed in detail in the topic given below.

### **Relation of Sukul to the Primary Level Mathematical Knowledge**

The chatai is related to the mathematical knowledge of the primary level. With the help of chatai we can be taught the basic concept of rectangle, parallel line, cylinder and spiral . The concept of parallel line and perpendicular line also we can taught. If we used object to teach the concept of students parallel line can understand easily.

Taking an interview with students 'A', he said " *I have a Chtaiin my house, my mother making it in beautiful pattern's . It shape seem to be like rectangle . But I don't have a information about what geometrical concepts are use in Chtai*

Students 'B' said " *I don't have Chataiin my house but my neighbor has a Chatai .I was surprised to hear that geometrical concepts are also used in Chatai"*.

Students 'C' Said:" *The teacher didn't tech that there are geometrical concepts in Chatai when teaching in the class room. It has have been easier for me to understand mathematical concepts, if I had shown the material at the local level while teaching."*

The research concluded that the above voice of students, all the students have seen the Chatai and it has used in their house. The teacher isn't using locally available metrical while teaching. The students were very curious to hear that mathematical concepts are used in the object at the local level.

Chatai is a handicraft material made by home an in Muslim community. Chatai is used to laid on a bed or floor for setting and sleeping. Observing chatai, it is clearly geometrical concepts where used in it's construction, mathematical concepts of parallel line, concepts of rectangular and the concepts of rectangular area have been used in chatai. It is a material found in to home of must Muslim students. In the Interaction with the primary math teacher during the research he said " *I have not taught the concepts of parallel line by used the example of chatai. I have only done the activities given in the test book. I have not taught using any educational material outsaid the test book"*.

The above information seen that the teacher is only depend on test book for teaching mathematics. However Vegotskey learning theory emphasize the need to used locally available educational materials to mathematics teaching learning process and to integrate students funerals, cultures and social activities then the learning is meaningful sustainable and practical. But researcher involves observing real classroom, taken interview with teacher and students. It was found that the locally available material, students cultures, social activities, social norm, social value and mathematics exists in community was ignored.

### Geometrical Concepts in Khatiya/Charpai

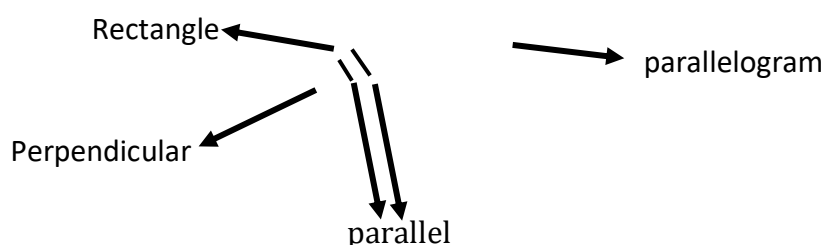
The khatiya has a curious significance to the Tarai region specially in Muslim cultural memory. Some consider it a symbol of a enduring rural poverty. Some may simply see it as a nostalgic item. Nevertheless, the Khatiya has survived and thrived as more than a novelty for centuries upon centuries. The Khatiya is a traditional hand woven bed. It goes by many names and the most common are variation of a term that literally means “four-footed”: Charpai, Charpoy and Charpaya. The Khatiya can also be referred to as Charpai, Khatlo, Khatt and Manji.

The respondents said *"I makes the foundation of a Khatiya which is a four-footed frame and rope or belts of fabric"*.

Due to the prevalence of rope variants the Khatiya is also sometime called a rope bed. The khatiya is also described as having four legs connected by four stave and of plaited surface in between.

The frame is usually made of light weight wood, such as mango. The rope of fabrics is typically made of natural materials as well cotton, jute, coir (coconut fiber) and even dried leaves those frame date palms modern technology has made its work on the Charpai these days a Khatiya can be made with synthetics and non-traditional materials metal frames and nylon wave material. The Khaatiya makers in the Tarai, provide their services to locals. If you should be there they make Khatiya for you. These specialists can buy all the materials come to your home and make the Khatiya there while you wait. Frames are easy to set up but weaving the Khatiya’s sleeping surface depending on the complexity of the design can take anywhere from minutes to hours. Some designs look like fishing net while some are woven so tightly together that it may as well be solid mat. The resulting netting has able to provide enough support for sleeping or sitting. The Khatiyai is particularly useful in warm and humid climate. The geometrical concepts found in Khatiya are,

- Parallel line
- parallelogram
- Rectangle
- Perpendicular line



- Right angle

Fig.No. 4.10

In Khatiya there are different types of geometrical concepts. The frame and leg of Khatiya are perpendicular to each other and the upper shape of Khatiya is rectangular. The some hole of Khatiya are parallelogram and some pieces of rope make parallel line. There for this object help us to teach the basic concepts of rectangle, parallelogram, parallel lines perpendicular line at the school level in geometry class.

### **The Relation of Khatiya to the Primary Level Mathematical Knowledge**

The Khatiya is related to the mathematical knowledge of the primary level. With the help of khatiya we can be taught the basic concept of square, parallel line. The concept of parallel line and perpendicular line also we can taught. If we used object to teach the concept of students parallel line can understand easily.

Taking an interview with students 'A', he said " *I have a Khatiyain my house, my Father making it in beautiful pattern.t . It shape seem to be like rectangle . But I don't have a information about what geometrical concepts are use in Khatiya*

Students 'B' said " *I don't have Khatiya in my house but my neighbor has a Khatiya.I was surprised to hear that geometrical concepts are also used in Khatiya".*

Students 'C' Said:" *The teacher didn't tech that there are geometrical concepts in Khatiya when teaching in the class room. It has have been easier for me to understand mathematical concepts, if I had shown the material at the local level while teaching."*

The research concluded that the above voice of students, all the students have seen the Chatai and it has used in their house. The teacher isn't using locally available metrical while teaching. The students were very curious to hear that mathematical concepts are used in the object at the local level.

Khatiya is used by people from the Muaslim community living in the terai region. It is made with the help of wood and rope. Observing this, it seems that various geometrical concepts have been used in it. Rectangles, parallelogram and perpendiculars and right seem to be used. Therefore, children who study in the primary level can be taught about parallelograms, rectangle and perpendiculars by observing it. This makes the teaching learning process meaningful, sustainable and practical. This type of activities helps to motivate students towards learning and then active participants in learning. Then the students can learn mathematical concepts quickly and easily. But in an interview with a math teacher, he said "*I have not used any additional teaching material in class room teaching. I wood like to memorize the practice given in the test book and the formula of the related problem. But materials*

*in the students home are not included in the teaching process".* However Ogbu (2000) cultural discontinuity and difference theory says that those children whose home culture is much similar to culture of school can cope easily with the system that may result better learning achievement. So that we need to connection students home culture students home made material in teaching learning process is possible as. In the context of primary level mathematical content. We can use Khatiya as a proper example for teaching rectangular shape. It is rectangle with the help of four frame where there opposite side of frame are equal.

## CHAPTER-V

### FINDINGS, CONCLUSIONS AND IMPLICATIONS

This chapter describes the major findings drawn from the analysis and interpretation and discussion of the data. Conclusion is described from the result of interpretation of data. The chapter closes with implication of the research. An implication of the study is given for the area where this study can be applied.

#### **Finding of the Study**

The purpose of the study was to find out the geometrical concept practice in Muslim community in their cultural artifact and to explore the relation of Muslim cultural mathematical practice to primary level mathematical knowledge. The research had analyzed and interpreted on the following heading geometry in Dhiki, Jato, Charpai, Doko, Chatai, Galaicha and Bhakari on the basis of analysis and interpretation of the data the major finding of the study areas follows

- Muslim culture holds innumerable mathematical ideas in their daily life used in grinder basket, clay, wooden materials. But children receive limited response to questions asked about mathematics they are less informed about the mathematical concept practice in their own community. They rely on their received knowledge.
- The concept of rectangular and square shape is in common practice among the Muslim. The parallel line and triangular are also dealt. They assume triangular is auspicious.
- Muslims have concept of constructing circular, cylindrical, parallelepiped, object to facilitate the daily life.
- The plastering framework or goods with a mixture of lime, paddy husk and cow dung reduce the weight of the articles. There are large number of Deharies of different shapes and size. Rectangular, cubical and truncated triangle for storing these products.
- Different geometrical techniques are used to construct different objects such as Khatiya, Dhiki, Dehari, Doko, Bhakari, Chatai, Wollen Galaicha. The shapes of various like circular, square, triangle, quadrilateral, pentagon, hexagon, rectangles, parallelogram etc. practiced by in Muslim community.
- The concepts of different measurement of angle are found in different directions. The arrangement of angles are seen when making different objects i.e. Doko (a kind of

basket) 360 angles is divided equally into six parts. The crosses of the bamboo splint in different direction create hexagonal shape in which the object is rigid and increases its strength. The  $90^{\circ}$  degree vertical and horizontal connection as well as 45 degree and diagonal bend are used.

- The Muslim of Kapilvastu of Banganga municipality has their own system of mathematical concepts and their geometrical knowledge. All these process based on traditional practice.
- There are many mathematical concept practice in the Muslim community but they were not found to be used in class room teaching.
- Lack of teacher's interest to used mathematical concept practice in Muslim community.
- Lack of ethno-mathematical knowledge of the teacher creates teaching learning effective to connection with student's culture.

### **Conclusions of the Study**

In Nepal, there are various ethnic groups which have their own traditional mathematical ideas. From the study the researchers reached to the conclusion that the present study is concerned with the mathematical ideas, and geometrical knowledge of Muslim community. But some ethnic group's mathematical ideas have still remained undiscovered. They could do very simple mathematical tasks slowly with using methods and roles of mathematics. Many household skills related to mathematics where learnt in the social context. To teach and study under formal education materials the primary level geometry is also trying to apply to teach for pedagogical purpose.

Nowadays, the concept of local knowledge implementation in government school's major priority. This research study was focused on local mathematical knowledge of Muslim community and their day to day practices of mathematical etc. activities.

It is conclusion that mathematical knowledge practices in Muslim community have strong relation with primary level mathematical knowledge such as circle from Nanglo perpendicular, parallel from in Dhenki (Dhiki) rectangular, rhombus from Khatiya, spherical from Madani household goods etc. and pentagon hexagon square, parallelogram from Sukal,. Therefore, there should be opportunity to share the ethno mathematics concept cannot be preserved in isolation of community. If they are isolated philosophical, ideological, view has disappeared. The priority of education should meet the needs of nation. This research needs the relation between ethno-mathematical concept and their relation to the primary level mathematical knowledge at modern mathematical ideas.



## Implications of the Study

This study was conducted taking a three month of time. On the basis of finding of this research, the following suggestions have made for future research.

- This study limited to Banganga municipality of Kapilvastu district. Muslim people settlements in different municipality of Kapilvasu district. They have different language, culture and system than that of Kapilvasu district especially related with abodhi and Nepali language. So the ethno-mathematics of Muslim can be studied in Kapilvastu district.
- It is interesting to replicate this type of study in different socio-cultural content of Muslim villagers.
- It is interesting to replicate this study in only on field of basketwork, clay work, wooden work for in depth mathematic formulization.
- To find teaching material available in the local community, which can get easily and students understand the concept meaningfully that makes teaching learning process effective and fruitfully.
- School may be applied practical knowledge based activities which can promote their previous experiences.
- To help in the purpose of educational decentralization of the government and it can emancipate any gender, race, culture group, class.
- To explore the many culturally diverse ways in which mathematics education can be made more meaningful.
- To find the possibility of incorporating cultural practices into the existing curriculum, this approach may be disseminated widely among school teacher so that they can incorporate the notion of cultural contextualization in their teaching.

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**Appendix - A**

**Interview format for Teachers - 2019**

Date of interview.....Sex.....Age.....

Name.....

Religion.....Qualification.....

Experience in Teaching:.....

Other:Trained/Untrained

Address:.....

V.D.C./Municipality:.....

Total no. of students: .....

The interview with mathematics teacher had taken in the following questions.

- What are the teaching strategies of the Muslim students ?
- How did Muslim students learn mathematics ?
- What types of teaching material do you used during teaching ?
- What are the problem of teaching mathematics for Muslim students.
- How did you encouragement of the learning mathematics ?
- How did you construct relation between teacher and students ?

**Appendix - B****Interview format for Students- 2019**

Date of interview.....Sex.....Age.....

Name.....

Religion.....Class.....

Address:.....

V.D.C./Municipality:.....

The interview with mathematics teacher had taken in the following questions.

- Is mathematics interested ?
- Have you found mathematics is useful in daily life ?
- Is mathematics and culture are related ?
- What types of material used by your teacher in your class ?
- Is mathematics is embedded in your community ?
- If the curriculum of mathematics is on your mother mother language, that, makes mathematics is easy and useful for your or not ?

**Appendix - C**

**Observation Sheet**

Observation in detail form:.....

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Observation in making process

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Possible mathematical concept

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Possible way to incorporate it.

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Reflection of observation

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