DIFFICULTIES FACED BY THARU STUDENTS IN LEARNING GEOMETRY

THESIS

BY

JAGAT BASNET

FOR THE PARTIAL FULFILLMENT OF THE REQUIREDMENTS FOR

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LETTER OF CERTIFICATE

This is to certify Mr. **Jagat Basnet**, a student of the academic year **2018/2019** AD with thesis number **1685**, Exam Roll No. **7328369**, Campus Roll No. **114,** and T. U Regd. No. **9-2-677-61-2010**has completed his thesis under my supervision during the prescribed by the rules and regulations of T. U Nepal. The thesis entitled **"Difficulties faced by Tharu students in learning Geometry"** embodies the result of his investigation conducted from **2020 to 2021** at the Department of Mathematics Education, University Campus, Tribhuvan University, Kirtipur, and Kathmandu. I recommend and forward that his thesis is submitted for evaluation to award the Degree of Master of Education.

..........……........……….................

Date: ……………........   **Prof. Dr. Bed Raj Acharya**

                                                                        Head

LETTER OF APPROVAL
Thesis Submitted

By

Jagat Basnet

Entitled

"Difficulties faced by Tharu students in learning Geometry"
has been approved in partial fulfillment of the requirements of the Degree of
Master of Education.

Viva-Voce Committee   **Signature**

Prof. Dr. Bed Raj Acharya   ………………………
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Mr. Krishna Prashad Bhatt

..   ………………………
  (Supervisor)

Date: ....

RECOMMENDATION FOR ACCEPTANCE

This is to certify that Mr. **Jagat Basnet** has completed his M. Ed. thesis entitled **"Difficulties faced by Tharu students in learning Geometry"** under my supervision during the period prescribed the rules and regulations of Tribhuvan University, Kirtipur, and Kathmandu, Nepal. I recommend and forward his thesis to the Department of Mathematics Education to organize the final viva-voce.

...……...……...............…………….

Mr. Krishna Prashad Bhatt

(Supervisor)

Date: ………………………………

DEDICATION

This thesis is dedicated to my father **Mr. Sher Bahadur Basnet,**

And mother **Mrs Bishnu Basnet,** *Whose love, support, and encouragement have enriched my soul and inspired me to*

Complete this research.

DECLARATION

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

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Jagat Basnet

ABSTRACT

The major purpose of this study was to explore the difficulties faced by Tharu students in learning geometry and analyze its causes at grade X students. In this research I selected 63 students for mathematics achievement test among them 16 students are Tharu community students. I selected 5 tharu community students whose performance is not satisfactory were selected for interview. The case study research design was used in this qualitative research. Data were collected from diagnostics test, observation and in-depth interview schedules.

After analysis and interpretation of data, the findings indicate students have learning difficulties in experimental verification, construction, Theoretical proofs and application of geometrical concept. Similarly the causes of difficulties in learning geometry were categorized as pre-knowledge, home/school environment, student's attitude and misconception. There is lack of interpersonal relation, do not able making connection between theorems and problem, geometric terms and visualizing the objects. There is no proper interaction between teacher and Tharu students at mathematics class. The poor economic status and home environment are not conducive for mathematics learning. Tharu students have no sufficient time for mathematics learning at home. This study show that the financial condition of Tharu community is not strong enough to send their children at school. Parents are illiterate and family size is large, which are also as indicator to create the problem for Tharu children in geometry learning.

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Chapter I

INTRODUCTION

Background of the Study

Mathematics as an expression of human mind, result from the discovering the formulation, the systematic development and the application patterns of inductive and deductive thinking. Mathematics is an essential part of human life. It is originated along with the different human civilizations. The word "mathematics" is derived from the mother language and the word "mathematician" which mean to learn. Its basic elements are logic and intuitions analysis and construction generality and individuality.

The following are the views of different mathematicians in defining the mathematics:

"Mathematics is a free invention of the human intellect" (Einstein)

"Mathematics is the gate and key of all sciences" (Roger Bacon)

Mathematics is the science, which draws necessary conclusion" (Pierce)

Mathematics is the study of pattern. It is through mathematical description that regularity and similarities in nature can often be clarified mathematics is the language of science and as such user carefully defined terms and symbolic representation that enhance our ability to communicate.

Geometry is the most useful and important branch of mathematics. Geometry includes an enormous range of ideas and viewed in many different way. It has been interlocked with many other subject view of human activities. The basic ideas of a mathematical system originated in geometry. Kelly and lad (1986) write, "It is not certain who first had idea of trying to prove a mathematical rule by reasoning rather that by testing it in different ways." The geometry is derived from the Greek, Geo metria (meaning measuring). As such geometry was initially conceived as the study of measurement of the earth. On the other hand, in the east this subject was called 'Rekhaganit'. About the development of geometry Butter and Wren say, "Primitive people obtained their first knowledge of geometry from natural objects and later on from art as well the need that arose to understand and came to further the legacy of art, architecture,

surveying, measurement etc. Provides the stimulators the development of science and similarly come in to existence and provide a strong foundation for the science of geometry" (Butler and Wren, 1941).

Geometry is one of the classical disciplines of math. In Greek, it is translated as "Earth measurement" and is concerned with the properties of figure and space. It is firstly progressed to be a practical guide for volumes, measuring lengths and areas, and is in use till date. Geometry is important because the world is made up different shapes and spaces. Geometry finds huge application in the real world. Geometry helps us in deciding what materials to use, what design to make and also plays a vital role in the construction process itself. Different houses and building are built in different geometrical shape to give a new look as well as provide proper ventilation inside the houses. Geometrical tools like protractor, ruler, measuring tape, and much more are used in construction work, Different art forms are made by joining different geometric shapes together. Engineers, architects and builders use geometry to calculate area and volume before they start making plans for different structure, so geometry is important in everyday life.

Teacher are the important agent for the successful implementation of mathematics curriculum. Only by hard work of the teachers the mathematics curriculum can be successful implemented.

Secondary level school geometry contains chapter of triangles, similarity, parallelogram, circle, areas of triangle and quadrilateral, coordinate geometry, constructional, etc. Output of the mathematics achievement is very low in SEE examination. And another great problem is outcome of the mathematics achievement on practical field. So, stakeholder, government of Nepal, parents and student itself dissatisfies among it and becomes subject of anxiety for all. Among the content of mathematics, geometry becomes more tension for teachers and they speak that it is useless why? But, I think there is a wrong conception among them.

There are two types of school existed in school education one is public and other is institutional. Parents and students interest increasing in institutional school where they pay more money. Government spent more money on public education. But student's achievement on mathematics has not satisfied. Where is the problem in mathematics achievement of students

being going to low? Geometry is a one area of school mathematics. So, I studies about the difficulties faced by secondary level students in learning geometry.

There are various researches about difficulties faced by student in learning geometry. Many government and non-government official research indicate the investment of huge amount of time and money to find the difficulties of learning geometry, satisfactory result was not found ,So I will finding the difficulties faced by student learning geometry in Tharu community in Dang District.

From the above study it is usually seen that those students who are the user of mathematics curriculum are facing with the fooling difficulties problems to deal other sources of problems in the implication of mathematics difficulties were:

- Teaching learning activities
- Physical facilities
- Classroom management
- Unavailability of instructional materials and lack of knowledge of to use it.
- Pre-knowledge background of students
- Economic factor
- Language

Above the modern mathematics classroom. Bhatia and Bhatia (1987) said that the teacher's tools have long consisted of chalk, blackboard, pencil and textbook. However, today is to use demonstration models of various shape and size, drawing instruments, graph, measuring instrument, many picture pamphlets, books and mathematical magazines. Film, slides, manipulative are being used in teaching mathematics in the modern class. But the learning in Nepalese schools is totally based on textbooks. Since the text book have been written in formal Nepalese language. It is more difficulties for those students who have other language speaking background. On the other hand the teacher used textbooks as an ultimate means of teaching that do not provide the opportunity of relating their learning with local context because of lack of financial problem. Nepalese school could not provide money to spend in materials and equipment. Some school do not have enough classrooms. A large number of students are packed

in a small classrooms. Physical facility such as teaching materials, mathematics lab, and collection of low cost free materials that are essential for teaching and learning activities are not organized properly by concerned agencies.

Introduction ofTharu

The Tharu people are indigenous ethic groups who have lived in the lowlands of Nepal for centuries. Tharu are the oldest inhabitant group in the Terai. Usually they lived closed to the heavily forested regions. It is said that the Tharu originally cultivated most of these lands and in course of time clever people come and got the better of them. It means there was a few Tharu king in terai. Tharus are mostly found in the terai extending from Koshi in the east to Mahakali in the west and some parts of inner Terai. The language between them also dominated by Maithali language and in the west Hindi and Abadi languages dominate it. Therefore, they speak a language mixed of Bhojpuri and Magadhi also speak Nepali. Tharu people have dark complexion, muscular slim body and an average height. According to Chaudhary (2003 A.D.) Tharus had maintained their kingdom and sovereignty some 2544 years ago. It was community who gave birth to a great personality like Lord Buddha. Today the whole world knew Lord Buddha was born in Tharu community and Lord Buddha was Tharu.

Tharus are one of such communities possessing indigenous identities. Tharus are the oldest inhabitant group in the terai usually they have close to the heavily forested region. Most of the largest compact Tharu settlement are found in tropical malaria area. It is said that most of these land were originally cultivated by the Tharus and in course of time clever people come and got the better of them. It is said that there were a few Tharu king in Terai. There are ruins of an old fort in Sakauragarh in Dang valley that said to be have been built by the Tharu king Decgai-Bhusai.

Tharu are agriculture farmers. They are very hard working people by nature and seem sincere and simple minded people. Small Percentage of people complete school education. Girls show little interest in going school, because of most parent cannot effort the expenditure of education. Some Tharu are economically quite well. They were educated and culturally well

exposed. Due to the difficulties with Nepali language, especially in the early grades of the primary school.

There are several indigenous sub-group of Tharu. They are (1) RanaTharu, who is live in kailali and Kanchanpur. RanaTharu claim Rajput origin. (2) Soha, who are live in Surkhet district (3), KothoriyaTharu, who live in Kailali district, (4) DanguagaTharu, who are live in western Terai (Dang, Deukhuri, Banke, Bardiya district), (5) RautarTharu, who are live Rupendei and Nawalparasi etc.

Because of lack of enough studies of Tharu students education we cannot find out their probability and challenges in education sector. Generally, low investment in education, poverty, limited economic sources and traditional concepts are assumed for the educational status of Tharu students. However the study is not an applied research, this may support to include the Tharu students for social development by finding out their participation in secondary school.

Statement of the Problem

Geometry studies about mathematics objects. It is fundamentally connected with the development of human civilization. It plays crucial role in the development of today's advance mathematics. When I studied secondary level, teacher had given task to make parallelogram, quadrilaterals, etc. At that time I was not able to make parallelogram, quadrilaterals as their property but as topological structure. Also geometry become more rigorous because of the different terms, definition, axioms, theorems and its application. Teacher always have been given the priority for rote learning and teach some selected questions and theorems as examination point of view. I came very disappointed from it. But when I studied further about geometry, I see the interconnection between different branches of mathematics. Then, I decided to research about why geometry became difficult for students? Today there are various learning approach and resources invented such as mathematical software geo-gebra. If we teach and learn geometry appropriately, we expect it help students understand geometry easily. So I am interested on the curricular content factors environmental factor that create the difficulties on learning geometry. Some research has been done on difficulties of the geometry learning. But I found these are theoretical. My study has concerned with identify students learning difficulties in geometry who

read on public school classroom. Both, teacher and student faced several difficulties in teaching and learning geometry. Many students have delicate negative believes which makes it more difficulties to read and learn (Thakur, 2018). So, my concern is here, why most student are becoming poor in learning geometry?

Formulating a research problem is the first and must important step in the research process. A research problem identifies our destination. Mathematics is taken as a difficulties subject by most of the students in secondary level. Bruner says that all students in students can learn mathematics, Students fell difficulties in Geometry also they seem to very week in geometry. Geometry is one of the important and applicable parts of the mathematics. It is believed that geometry is the most important for developing and developed country; we cannot ignore the effect of worldwide wed in our daily life even in developing countries. So, geometry is being prominent all around the world especially in the field of education

When I was studying in secondary level, I got low marks in geometry as the period of the examination. I have 3 years' experience in teaching field at secondary level as a mathematics teacher. Most of the students did mistake in geometry questions' in the period of exam. Most of the students they left questions related to geometry but they solved other question, So, I become interested to do research on the topic "Difficulties faced bytharu students in learning Geometry". I do case study in Tharu community, so it is well appropriate to discuss about the difficulties and suggest the probable strategies in geometry. This study should answer the following questions:-

- What are the difficulties faced by tharu community students in learning geometry?
- What are the causes for the difficulties in learning geometry?

When I was study in school there was maximum number of students are from Tharu community, before one year ago when I had gone Janata Sanskrit Secondary School, I would found similar number of Tharu community students. I find that students are weak in geometry, So, I want know that, what are the problems in geometry teaching.

Objectives of the Study

1) To explore the difficulties of students in learning Geometry.

2) To analyze the causes of difficulties in learning Geometry.

Justification of the Study

The study was significant for the reason that helps to determine difficulties faced by tharu students in learning geometry, which can use to improve the mathematics teaching learning process and to reduce the failure rate in mathematics. This study has provide the appropriate information about the difficulties of students in learning geometry. This study opens the door for further research in the field of learning problems of Tharu students. So, the research has been becomes more relevant and contextual.

Every research is important because it gives detail of various unseen facts in any area of study. Mathematic is one of the most essential and important subject, education can't be complete without mathematics. Geometry is also the one of the main and important unit of the school and campus curriculum.

Every research has its own important and Significance. The main significance of the study are as below:

- This study helps to researcher to find the difficulties in learning geometry.
- It helps to the teacher for selecting the teaching method and materials.
- It helps to mathematics educators and teachers to construct the different model on geometry learning.
- It provided the ideas how to minimize the learning difficulties of student's.
- The study helps how the learning environment affects in the achievement of mathematics
- The study helps to decrease the rate of low achievement in geometry of Tharu students.

Delimitation

This study was conducted to find out the curricular content factor and environmental factors of difficulties of learning geometry in grade X students. This research is based on only public school. Researchercomplete the research on the topic "Difficulties faced by Tharustudents in learning geometry" in Dang District, According to the research time delimitation are as follow:

- This study was related to difficulties faced by students in learning geometry at grade X of dang district.
- I focusto find the difficulties on only Tharu students.
- The study cover geometry part only of compulsory mathematics of grade X.
- Study was include all Tharu children of Janata Sanskrit Higher Secondary School who are studying in Grade X.
- Data collection through open ended questionnaires, closed type questionnaires and classroom observation.

Definitionof the Key Terms

Every study constitutes of the key words depending upon the problem, topic, method and variables. The researcher uses the following terms and the operational terms which were defined as follows.

Tharu. Tharu refers to grouping of traditionally, pastoral, communities or cast and ethnic group of Nepal.

Public school. The school that get approved by government for establishment and further continuing with financial support by the government.

Difficulties. In this study difficulties means those students who are unable to understand terms, meanings, and conditions of geometry in grade X. Also difficulties refers to huddles of students in experimental verification, construction, Reasoning, theorem proving and problem solving.

Learning. A more or less permanent change in behavior, which occurs as a result of instructions and practices.

Learning Difficulties. Learning difficulties is observation in learning of mathematics in which students feel due to communication, interaction, recall basic mathematical facts, procedures, rule, formula, participation, language, during mathematical works, content and principle.

Teachers. Teachers who are teaching mathematics at secondary level Geometry: The science that treats of the shape and size of things, the science of properties and relations of lines and solids.

Students. In this study students means that students who are reading at Grade X of Janata Sanskrit Secondary School Tulsipur 18 Bijauri Dang and taken compulsory in the school.

Chapter - II

REVIEW OF RELATED LITERATURE

The purpose of this chapter is to review literature related to the topic of this study. Based on the research problem, research objectives and research questions under investigation this chapter literature review makes critical summery of study. We can get many ideas about how to make a research design for suitable research. There are two types of literature one is empirical literature and another is theoretical literature. The empirical literature includes that for the any research what kind of tools used by researcher, how researcher collected the data, method of analysis, total time taken by researcher etc. The theoretical literature refers that what kind of learning theory can apply for this research.

Empirical Literature

I was review some empirical studies carried out by different researchers from Tribhuvan University, journal, article and other Abroad University documents for this study.

Sapkota (2017) conducted research on "Exploring learning difficulties in school level Geometry". To identify the learning difficulties in geometry in school level. Her study was based on a mixed design, also she took class observation, achievement test among 200 students. She took interview and questioners tools to find the difficulties. She made two objectives: To explore the difficulties in learning geometry and to analyze the causes of difficulties in learning geometry. She concluded that the student fell difficulties in learning geometry because of school environment, home environment, lack of pre-knowledge, motivation and interest, learning activities, teaching method and techniques. If the school provides sufficient teaching material about geometry then the difficulties in learning geometry would be minimize.

Pant (2007) conducted research on "Learning difficulties in mathematics among grade 5 students in Kathmandu". He took 1216 students (593 ruler and 623 urban) as a sample size from Kathmandu. He uses interview, survey and diagnostic achievement test in algebra. He concluded that more student have learning difficulties in mathematics in algebra, student have problems in learning concepts and vocabulary such as algebraic terms, expressions, power coefficients and equations .More students show negative effect on their performance in mathematics learning

Paudel (2019) conducted on "Difficulties in learning trigonometric problem". The major purpose of this study was to explore the difficulties in learning trigonometric problem and analyze its causes at grade IX students. This study was carried out on four private schools of Kaski district; in this research he selected hundred students for mathematics achievement test. He did case study in the qualitative research. Data was collected from diagnostics test, observation and in-depth interview schedules. The causes of difficulties in learning trigonometry as motivation, pre-knowledge, home/school environment, student's attitudes and misconception. Students had difficulties in mathematical definition, symbolizing of mathematics terms, mathematical representation and notation, also students faced difficulties in using formula, making connection between definition and problem, finding significance value, separating and multiplying the power of trigonometry terms and visualizing the object. The difficulties reason is lack of conceptual knowledge, less practice at home, lack of confident, teaching method. The teacher should use students centered method for teaching and his role as a facilitator. Learners

should be given enough opportunity to do regular problem exercises as this increasing their reasoning skills.

Regmi (2019) this is a qualitative research entitled with "Exploring Conceptual and Procedure Learning Difficulties in School Coordinate Geometry" is intended to explore conceptual and procedure difficulties faced by the student in learning coordinate geometry. He used mathematics achievement test and in-depth interview tools to find and perceived learning difficulties. This study based on case study research design. The four school of Kaski districts comparing total of 80 students were selected for the sample of study. In conceptual difficulties, student feels difficulties in defining co-ordinate term, symbolization, mathematical representation of the term, visualizing and understanding the object, recognizing abscissa and ordinate. In procedural difficulties, student feel difficulties in using appropriate formulas, solving procedure, selecting proper formula, assuming coordinate, substituting assuming value in formula, understanding ratio, points and its relationship, solving equation, recognizing variable and constant in equation. So the result show that some students had difficulties in mathematics in mathematical term or mathematical symbolization or mathematical representation, so teacher should focus on mathematical vocabulary. Teacher should visualize the mathematical vocabulary. Teacher should be focus on the concept of coordinate geometry. Teacher should use

teaching materials for teaching. Teacher should focus to establish the interrelation between the properties of figure or object.

Tatlah (2017) did a research on 'An investigation of students learning difficulties in mathematics at secondary level.' The main objective of this study was to examine students learning difficulties in geometries, Arithmetic and Algebra. They selected 60 mathematics teacher and 300 student through simple instructional materials, irreverence of teacher's training, lack of physical facilities etc. Further he concluded that the lack of motivation to learning mathematics is poor on the part of students.

Atebe and Schafer (2011) assert that students' general mathematical competencies have been linked closely to their geometric understanding. Research has also noted that geometry is difficult to teach as well as to learn. Coordinate or analytical geometry, for instance, requires not only geometrical knowledge, but also a vast amount of knowledge in working with coordinates on 2D or 3D set of axes. These addition concepts make geometry more complex and require an intricate manner of thinking. So co-ordinate geometry also play vitriol role to understand geometry. In geometry content, there is procedure, conceptual, strategic, declarative, knowledge included. Analyzing transformation geometry involves many different types of knowledge as defined by Hiebert (1986) such as procedure, conceptual, strategic and declarative knowledge.

Pokhrel (2019) studied on "cause of low performance of students in mathematics" intended to find out the causes of low performance in mathematics and to identify the strategies taken by school to improve mathematics performance of students. Qualitative case study design was used as a research design. Four students of grade x were selected by purposive sampling method. Direct interview with four low performance students in mathematics, classroom observation, respective teacher, head teacher and parents of the school were taken. Collected information was analyzed by using different theories. He was found that

-socio economic status was very poor

-learning culture was negative

-poor facilities classroom management

-traditional teaching methods

-lack of reinforcement and feedback in classroom

-lack of teaching materials and lack of qualified training teacher

Bajracharya (2010) studied on "factor affecting students related variables and mathematics achievement " conclude that the finding of the study ,out of five students related independent variables, standardized coefficients are used to compare the contribution of independent variables whereas unstandardized coefficient are used for constructing a regression equation. The researcher found that the above empirical research the performance of students are dependence are so, many factors some of these factors are occupation of parents, parents education, economic status of parents, facilities of child to provides their parents etc.

Sharma (2011) did study on "Problem faced by students and teacher in teaching and learning activities on vector at secondary level''. The main objectivities of this study was to find the problems on teacher and student in teaching activities on vector & to identify the pre knowledge of students and teacher in vector as well as to determine attitude, belief and interest of students on vector. The sample of this study was only two school of urban and rural area each of them six students were selected. For the data collection observation and interview was used as a tool. The study concludes that giving lecture and using chalk and board only may not help average and below average students to understanding mathematical concepts of vector in normal class. There was a lack of motivation and encouragement about vector class.

Kafle (2019) studied on "Conceptual and procedural difficulties in learning in derivative" intendant to explore the difficulties of conceptual understanding and to explore the difficulties of the procedural understanding of the derivative case study was used as research design. The case for this study was the students of the grade XI. 40 students of grade XI was selected by purposive sampling. The study site was Makwanpur Multiple Campus. The total four problems were asked in the CPUBT which was constructed on the basic of APOS theory. The finding of this research were

- Week concept to understanding the derivative as rate of change.

- Unable to understand the clear geometrical meaning of the derivative

- Unable to make exact sense of limit necessary to study the derivative

- Unable to use power rule to find derivative

- A student becomes exam oriented which makes the derivative as one of the difficult topic.

Bhandari (2017) studied on " Difficulties in learning group theory" intended to explore students difficulties in learning group theory at grade XII, and to analyze the cause of difficulties in learning group theory in grade XII. Qualitative case study design was used as a research design. Five case students were selected by purposive sampling method from a school. This study was conducted in a school with five case students by using interview and set of questions consisting of five different domains: understanding, reasoning, proving process, problem solving, and reducing abstraction was prepared on the basis of blooms taxonomy of educational objectives. The result from the test administration and interview of the respondent's information was analyze and strengthened with the help of related literature review supportively and validating the result further APOS frame work was used. Major finding of this research were,

- Understanding

- Lack of link between pre-learned concepts

- Reasoning

- Less interests and motivation towards solving group theory problems.

Gautam (2016) studied on "Difficulties in learning vector geometry in school level" intended to explore the different kinds of difficulties in learning in vector geometry and to find the ways to minimize these difficulties in secondary level. Descriptive survey design was used as research design. This study was conducted in public secondary school with seven case students by using test, interview and observation as research tools. Major findings of this research were

- Attention

- Conceptual output and organizational

- Language difficulties

Kwon (2016) conducted a research on the topic "conceptualizing vector in collage geometry: A new framework for analysis of student's approaches and difficulties". The goal of framework is to give a new way to discuss the complexity of vectors both conceptual and pedagogical that students may grapple with in order to understand vectors in geometry effectively. He conducts for survey and interviews were carried out. For data collection he used ninety eight students who are pre-service secondary and elementary/ middle level teachers from students located in Midwest public university. The researcher focus on physical to mathematical combinations, analytic to synthetic combinations, geometric to symbolic abstraction process-object duality in geometric representation and the prevalence of analytical approaches to the synthetic approaches while developing mathematical abstraction. He found problem in student's works there is difference between physical and mathematical vector problem in definitions and transformation and transformation process, object duality on geometric representation of vectors transformation process, object duality on geometric representation of vectors transformation of school known to other concepts.

Theoretical Literature

There are so many learning theories that are widely used in the process of teaching and learning. Among them according to the nature of studies Van Hieles model of teaching and learning is very influential and efficient for geometry teaching and learning. The Van Hiele theory describes how people learn geometry. It postulates five level of geometric thinking which are labeled visualization, analysis, abstraction, formal deduction and rigor. Each level uses its own language and symbols. Students or pupils pass through the levels "step by steps". This hierarchical order helps them to achieve better understanding and result. This article presents an overview of the model. It is focus on possibilities how to apply this theory on mathematical education. First of all students need to visualization the geometrical objects and clear the information about what is given and what is need to find then students goes on the practical experimentation and then theoretical deduction and rigor.

The Van Hiele theory has three aspects: the existence of levels, the properties of the levels, and the progress from one level to the next level.

Van Hiele Level

According to the theory, there are five levels of thinking or understanding in geometry:

- Level (0): Visualization
- Level (1): Analysis
- Level (2): Abstraction
- Level (3): Deduction
- Level (4): Rigor

Level (0): Visualization (Basic Visualization or Recognition)

At this level pupils use visual perception and nonverbal thinking. They recognize geometry figures by their shape as "a whole" and compare the figures with their prototypes or everyday things ("it looks like door"), Categorize them. They used simple language. They don't identify the properties of geometry figures.

Level (1): Analysis (Description)

At this level pupils(students) start analyzing and naming properties of geometry figures, they do not see relationship between properties, and they think all properties are important. They can measure, fold and cut paper, use geometric software etc.

Level (2): Abstraction (Informal deduction or ordering or relational)

At this level pupils or students perceive relationship between properties and figures. They create meaningful definitions. They are able to give symbol arguments to justify their reasoning. They can draw logical maps and diagrams.

Level (3): Deduction (formal deduction)

At this level students can give deductive geometric proofs. They are able to differentiate between necessary and sufficient condition. They identify which properties are implied by others. They understand the role of definition, theorems, axioms and proofs.

Level (4): Rigor

At this level students understands the way how mathematics systems are established. They are able to use all types of proofs. This systems can't be learned by rote, but most be

developed through familiarity by experiencing numerous examples and counterexamples. The various properties of geometric figures, the relationship between the properties and how these properties are ordered. The five levels postulates by the Van Hieles describes how students advance through this understanding.

Properties of levels

The levels have five important characteristics:

Fixed sequence (order)

A student cannot be at N without having gone through level (N-1). Therefore, the students must go through the levels in order.

Adjacency

At each level, what was intrinsic in the preceding level become extrinsic in the current level.

Distinction

Each level has its own linguistic symbols and its own network of relationship connecting those symbols. The meaning of a linguistic symbol is more than its explicit definition; it includes the experiences which the speaker associates with the given symbol. What may be "correct" at one level is not necessarily correct at another level.

Separation

Two person at different levels cannot understand each other. The teacher speaks a different "language" to the student at a lower level. The Van Hieles through this property was one of the main reason for failure in geometry.

Attainment

The learning process leading to complete understanding at the next level has five phases' information, guided orientation, explanation, free-orientation, integration, which are approximately not strictly sequential.

Although many studies all over the world demonstrated that Van Hiele theorem can help improve geometric understanding. It was not taken into account in Czech mathematical education. Traditional teaching method often involve only the Integration phase, which explains why students do not master the material. Teacher believe they express themselves clearly and logically, but their reasoning is not understandable to students at lower levels.

Conceptual Framework

The conceptual framework is the basis of research problem. It stems from the theoretical framework and usually focuses on the section which becomes the basis of study. From the above review of literature and theories I conclude that student faced difficulties in learning geometry were following conceptual framework for this study.
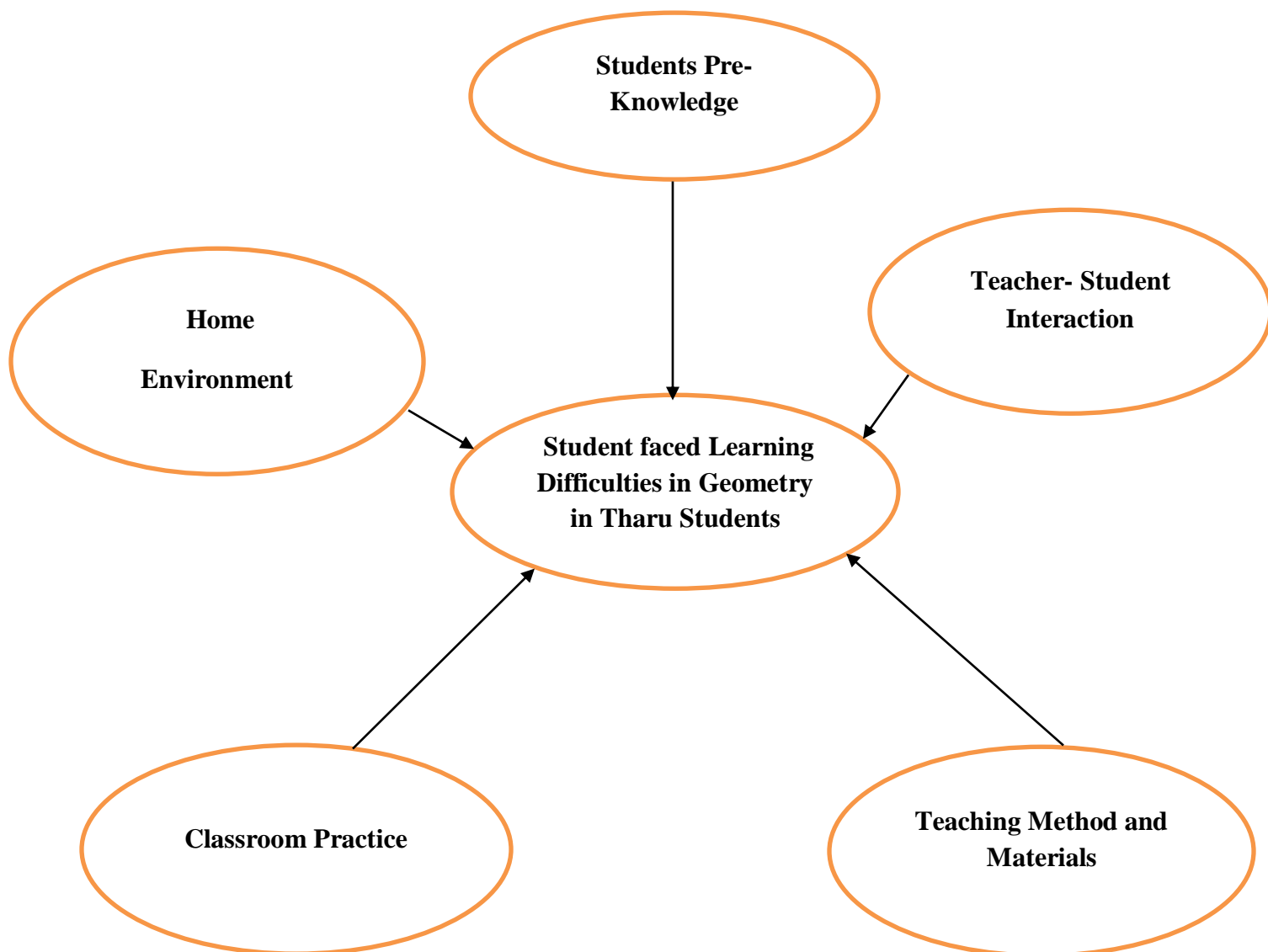
From the above discussion point of view in related literature, difficulties of teaching and learning mathematics in geometry may depends upon variables. These variables affecting students learning process in geometry are teachers and student's interaction, student's active participation, student's involvement, teachers and students activities, student's behavior towards homework and classwork, pre-knowledge of students and teaching and learning environment variables in tharu community students.

Such as study time at home, attitude of parents, physical condition of students, significant on teaching and learning, it analyzes teaching method, use of instructional method, use of instructional materials, use of teachers guide lesson plans and unit test, class test, continuous evaluation positive attitude of teachers towards students etc.

The Van Hiele method suggest that problems of teaching and learning geometry. Van Hiele characterized these levels as visual, descriptive abstract and formal deduction. At the first level, Students identify shapes and figure according to their concrete examples. At the second level, students identify shapes according to their properties. At the third level, students can identify relation between classes of figure and can discover properties of classes of figure by simple logical deduction. At the fourth level, students can produce a short sequence of students to logical justify a conclusion and can understand that deduction is the method of establishing geometric truth according to this model.

Geometry teaching can't be learned by rote, but must be developed through familiarity by experiencing numerous examples and counter examples, the various properties of geometry figures help the relation between the properties, and how these properties are ordered. Therefore, van Hiele model helps to improve learning geometry but structural change must be necessary in classroom environment, positive attitude and behavior towards the teaching and learning geometry and geometrical concepts.

Students Pre-Knowledge

Mathematics is to be taught by applying the formal skill and knowledge. The concept that is helpful to learn new topic. Student's pre-knowledge is the knowledge the learner already meet new information. A learner understanding of a text can be improved by activities their pre-knowledge before dealing with the text and developing this habit is good learner training for them. The importance of engaging prior knowledge when someone ask you a question or you have a new

problem to solve the knowledge that you bring forward into your working memory to formulate an answer or explanation is the knowledge that you have already understanding of the subject.

Home Environment

The home learning environment is a reflection of the home environment and interactions in and around the home with family members. Children learn to investigate the world through the family context and as such it provides the blueprint for learning, behavior and attitude. Parents are responsible for ensuring that their children were well-fed, well-rested, and happy and calm, creating a positive physical and mental atmosphere in the home helps prepare students to be ready and able to learn.

Classroom Practice

The success of learning and educational plan and programs depends on the classroom practices. Classroom practices refer to everything that goes in classroom. It includes the relationship, interaction and communication between teacher and students and among the students. It is one of the main factors that affect the students' performance in learning geometry. Class performance means students attention in learning geometry during teaching, learning environment, teaching and students' co-operation, teacher's idea of delivery etc.

Teaching Method and Material

The selection and use of teaching methods and instructional materials plays a crucial role for the effective classroom practices. There are various types of teaching methods that can be used in classroom practice. The selection of appropriate teaching method for a particular topic can be considered as the measure aspect of effective classroom practices.

Teacher-Student Interaction

Between the teacher, students and learning environment in classroom, teacher is the main agent for curriculum implementation. Students perceive most behavior of teacher and impressed to teachers, so the role of teacher in classroom is most important. The activity of teacher in classroom is most important, the activity of teacher in classroom are to guide students, and facilitate the learning environment, encourage, motivation, monitoring student's progress and use appropriate teaching materials, method. And the role of students is to do the activities promoted by school curriculum and task by giving teachers as performer in classroom

Chapter-III

METHOD AND PROCEDURES

This chapter presents the method and procedural of the study which was carried out to achieve the objectivities of the study method is the guideline, which helps the researcher to research in a scientific and systematic way. this chapter includes the design of the study ,population of the study ,sample of the study ,tool instruments of the data collection .data collection procedural and data analysis procedure in different subsection .the present research focused on "Difficulties faced by student in learning geometry" .

Research Design

A research design is a detailed plan for collection and analysis of the data. It is also a way of research that provides the direction for researcher to achieve the goal. I selected case study research design because this research was qualitative and the main objective of this research was to find difficulties faced by Tharu student in learning geometry and analyze the causes of learning difficulties in geometry. For this the students who had difficulties in learning geometry was my case. So, main concern of this research was to find overall difficulties in learning geometry in grade X.

Data Collection Tools

In my research I selected government school of dang district for data collection. Because in my teaching experience, I found that some students were faced difficulties in learning geometry. Among them Tharu community students who were very weak in geometry, so for my research I selected Janata Sanskrit Secondary School Tulsipur 18 Bijauri Dang.

The Population of the study are all the mathematics students of grade X, mathematics ansd students of Janata Sanskrit Secondary School. The sample of this study would be consist of secondary school, mathematics teacher. The sample of students are selected by purposive sampling method for this study. In this study researcher would be generate data through classroom observations form, mathematics achievement test, in depth interview Open ended questioner etc.

Classroom Observation

The researcher observe the Tharu community students with observation form and take participation and non-participation role when observing class room interaction and teaching learning activities of the class. Researcher observe classroom activities of students and teacher, reaction and participation of the students.

Mathematics Achievement Test

Mathematics achievement tests measure student's understanding of subject area or skills base. Achievement procedure is an examination to identify an individual's specific areas of weakness and strength in order to determine a condition of students. Achievement testing in mathematics typically provides a level for the student's mathematical skill. In my research I selected achievement test to find area of student's difficulties.The objectivities of mathematics achievement test is to measure the extent of a candidates backlog in basis mathematics knowledge and skills .the test will construct on the basis of the objectivities of the study :knowledge, understanding ,skills and application level .achievement test consist of question with objective and subjective questions.

In-Depth Interview

Interview is an important method to collect primary data. It is a data collection procedure including verbal communicate between the researcher and the respondent by face to face situation. In-depth interview are a qualitative data collection methods that involves direct, one to one engagement with individual participants in depth interviewing can take place face to face or in some cases over the phone the advantage of in-depth interview over focus group include the following :better rapport in a one to one setting .in this research the researcher will use in depth interview with respondents .the researcher take the interview on the basis of the objectivities the researcher develop interview schedule in semi structured form on the basis of observations conducted in the classroom, activities of individual ,participation of classroom and groups in different setting . To find students difficulties and causes I selected in-depth interview. First of all I took achievement test for finding area learning difficulties. On the basic of this achievement I selected 5 students of Tharu community whose performance was not satisfactory for in- depth interview.

So I, took interview with students, mathematics teacher and head teacher, why students faced difficulties in geometry.

Validity and Reliability of Tools

The validity and reliability are the necessary qualities of research instrument, for the interview, validity has established by subject expert and supervisor whereas the reliability of the interview has been established by taking the interview with the same individual after certain duration. For the observation form the previous research report has been taken.

In my research, before the interview open ended question sets has prepared. The interviews of teacher, students and head teacher participants are one-one in-depth and conducted at multiple levels until the data are saturated.

Researcher has took interview with 5 students, mathematics teachers, and head teacher from Janata Sanskrit MadhyamikVidhalaya, Bijauri Dang. Through interviews, researcher tried even the student participants and the data from the field observations justified that they use such practices and activities.

Data Collection Procedure

At first I visit the case school and take the permission from the head teacher for in this research ,observation form and interview guidelines will use as a data collection tools .after taking permission researcher I observe the classroom using observation form for ten days in secondary level students of Tharu community. The researcher watch ,listen ,interacts and notched the essential data from the information about learning environment and activities in real situation researcher was take interview with teacher ,head teacher and 5 students with the help of interview schedule guide line.

Data Analysis and Interpretation

Data analysis is the most crucial part of any research data analysis summarizes collected data. Data analysis is the process of inspecting, rearranging, modifying and transforming data to extract information from it. Data analysis is the process that involves examining and molding collected data for interpretation to discover relevant information, draw or propose conclusions and support decision making to solve a research problem, meaning are identified and information is interpreted (Creswell, 1994).

All information are collect from primary sources. The data are collect by interview and observation with students, teachers. In this study I use thematic for data analysis.

Chapter IV

Analysis and Interpretation

The most important part of the study is to analyze the collected data. This chapter deals with the analysis and interpretation of data with the help of achievement test and questionnaire. An experimental research was done in concerning with the topic "Difficulties faced by tharu students in learning geometry.''

This is a case study related to the difficulties in learning geometry at secondary level. To fulfill the objective of this study the researcher selected Janata Sanskrit M.V, Dang. According to the set objectives, of the study, researcher marked the response of observation, interview and information noted on class observation.

There were altogether 63 students in class ten, First I had planned to administrate the exam/test for all students due to absent of one student it was administrate to the 5 students of Tharu community students of the class. Then I checked all answer sheets of the students and selected the answer sheet which is highly difficulties occurred. Among them I had selected 6 student from Tharu community students for the interview on the basis of their mistake in their answer sheets.

Difficulties in learning Geometry

By the help of achievement test paper, researcher took 63 students of public school of grade X. Students who did all questions without any error and get average marks were consider as excellent, students who did partially correct but tried all the students get average marks were consider as good and get below average marks were consider as poor.

Experimental Verification or Visualization

The first stage of Van Hiele models of geometrical test is visualization. In visualization some errors that students did are kept as one of main base to analyze the difficulties. The difficulties related to experimental verification were also analyze on the base of achievement test paper. Experimental verification portion contained the question related angles. Students got

excellent mark who did without any errors and got above the average mark, some students were found good who did partially correct but tried to solve question but tharu community students must of students didn't make complete. The model answer book of the sample respond is presented below:
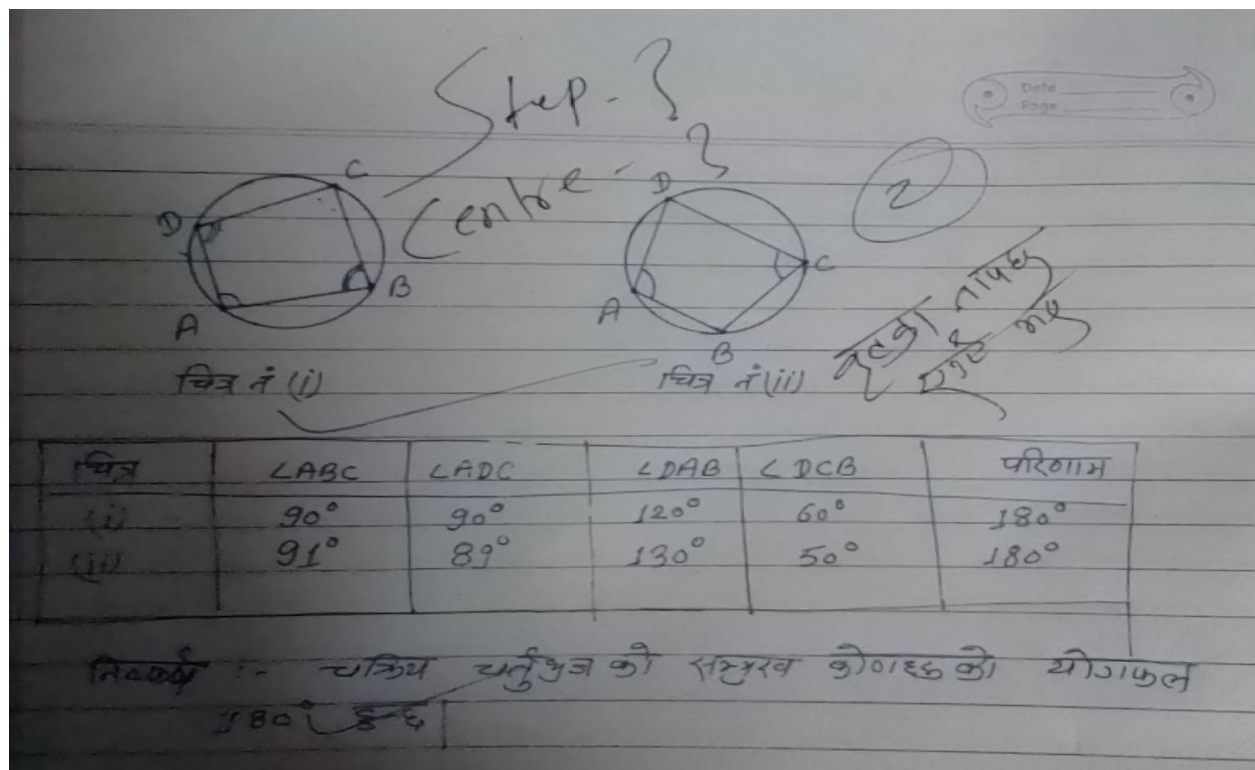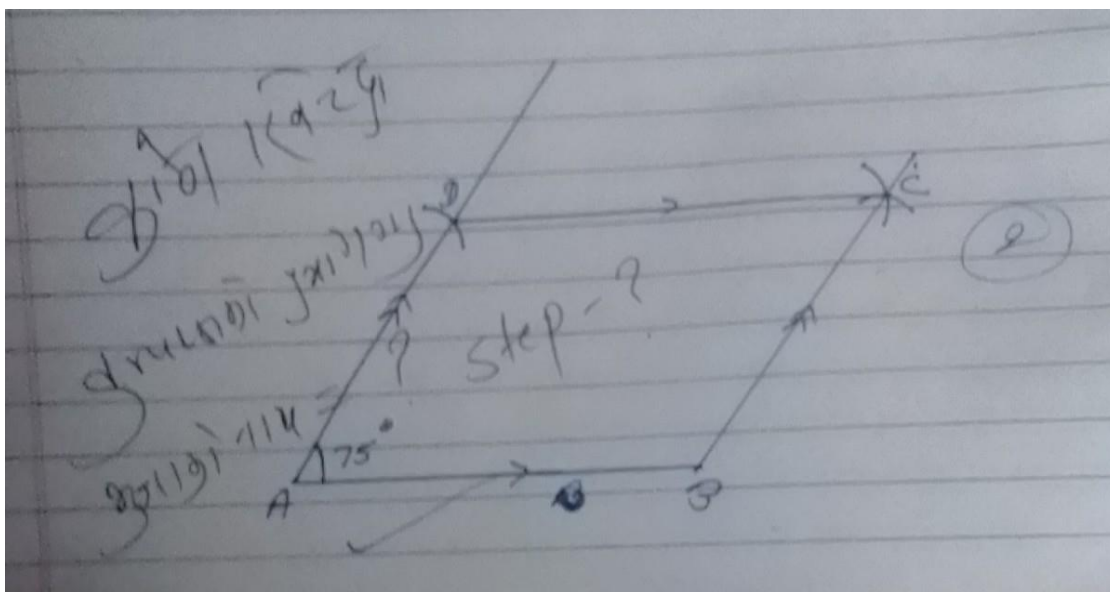

In the Answer sheet, student didn't write activities to solve the problems stepwise. They correctly measured the angles in the tabulated form and wrote conclusion correctly. From the above model answer, it seems that some students have very poor idea to identify and measure angles. They have no idea to write the activities in systematic manner. From the above data show that students have difficulties on experimental verification.

Construction.

Construction develops skill of making correct figure from given data through geometric tools. (John,2015), defines construction as;

"The drawing of various shapes using only pair of compass and straightedge or ruler. No measurement of lengths or angles is allowed. The word construction in geometry has a very specific meaning: the drawing of geometry items such as lines and circles using only compasses and straightedge or ruler. Very importantly, you are not allowed to measure angles with protractor, or measure with a ruler."

So it is very important part of geometry. To find the difficulties of geometry, I gave construction of parallelogram.
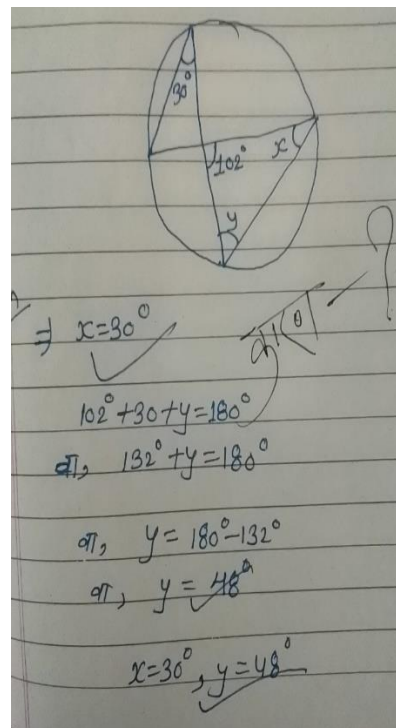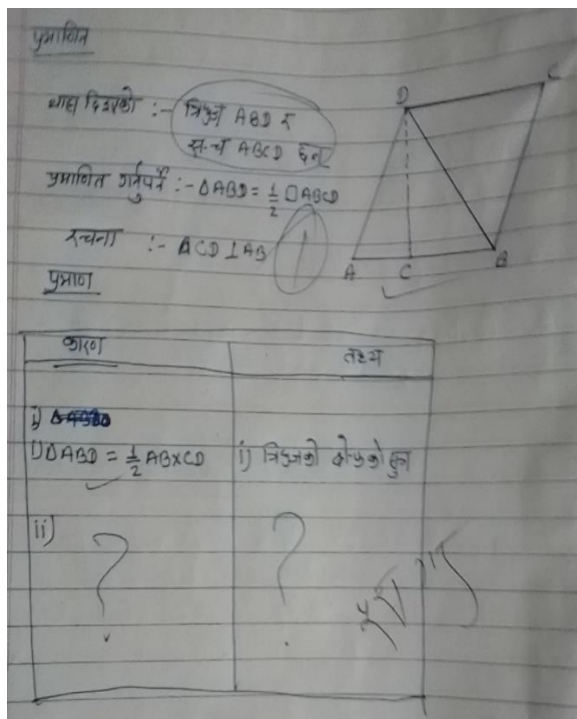

In the answer sheet, students drew arc by compass correctly but they didn't write the length of sides and relation between sides properly. Similarly, they did not present conclusion and steps of construction in problem. From above, I concluded that the students have problem to write steps in the construction of geometric shapes. As the Van Hiele theory of geometry construction this type of problem is mentioned as problem of constriction and the students of this age shows this type of error in solving geometric problem.

Theoretical proofs and Application of Geometrical concept.

Math achievement test was designed based on Van Hiele's model of teaching that consist of five phases among them are theoretical proof and fifth of learning application of geometrical content. Geometrical proofs are very important part of geometrical content which develops the logical power of the students. It is more challenging than the other parts. Also application part is

also very important. It requires pre-knowledge and skills about conceptual understanding of definition, properties, theorem and formulas to compute the question of application. To find the difficulties I gave theoretical proof and application of geometrical problem.

In these answer sheet, students drew a figure and wrote given condition and to prove also construct perpendicularity but they left the proof part of theorem and in problem solving they made correct answer without given any reason. It clears that students have not clear concept of geometry, so, students felt difficulty in geometry.

Causes of Difficulties in Learning Geometry

To find the causes of difficulties in learning geometry was second objectives of this research. To explore the causes of difficulties faced by tharu students in learning geometry, researcher used Interview guidelines from students, math teacher and head teacher.

Students Pre-Knowledge

Pre-Knowledge is important role to learning such as students need understanding of vocabulary terms in order to conceptualize and connect new learning to previous learning for long term memory revival. If students do not have pre-knowledge about some topic then they

unable to understand the question what to do and cannot solve the problem. It show that lack of pre-knowledge is important cause of learning difficulties in mathematics.

"Pre-knowledge of students play vital role in achievement of mathematics. Most of the students is very weak, they have lack of pre-knowledge because they didn't labor hard in mathematics like other subjects, in this regards students feels mathematics as a very difficulties subject."   (Teacher)

"Most of thetharu students come from very weak family background, they are not regular in class because of their housework so they have weak pre-knowledge in mathematics in this condition, how to better result achieved"

(Head teacher)

From above view of the teacher and head teacher we can guess students are afraid in mathematics. Teacher also didn't active in teaching learning process.Tharu students who wanted with working were by heavy duty of the house. Most of time they were working. They hardly got rest of time. They do not have enough time to study, therefore geometry is difficulty for them.

Teacher-students Interaction

In teaching learning process teacher-students interaction is most important part. Interaction is the transfer and understanding of meaning. How the cell and the capillaries are important in human body likewise interaction is most important part of learning for the students and teachers. Also, it is the social process and may be within person or in groups. Teacher should be well trained, endurance and should exhibit good behavior to all students. Students should be obedient, punctual, dedicated with teacher and friends. Teacher should play the role as an instructor and show the way to solve student's difficulties and students should follow that always should respect to the teacher and teacher always be positive towards students and always encourage students to learn.

"Our mathematics teacher is very strict, so we are afraid to ask any types of question of geometry. So that we cannot ask any question of this topic, so we are weak in geometry."

(Student)

"Students are not interest in geometry, they thought that geometry is the hardest topic, so they are ignore this topic. They didn't do homework and didn't regular their classes and they didn't attempt any questions about this topic. Few of them are interact with me which are in good in math. Therefore, they are not good in geometry."

(Teacher)

"Student's teacher interaction is essential in effective teaching learning. School couldn't strict in a way that it could allow freedom to the students. They have their own thinking so, we have to give them more choice."

(Head Teacher)

From above views there is a lack of interaction between students and teacher due to teacher's behavior as the teacher want to keep the students in well discipline. Students said that we are not understand this topic, so we are not interested to learn and the teacher also say that student are also not interested to learn and solve this types of problems because of their mental. So, they are not interact with teacher about this problem. Also students were afraid from the behavior of teacher.

Teaching method and Materials

Teaching method and material, also known as instructional materials, are any collection of materials including animate and inanimate objects and human and non-human resource that a teacher may use in teaching and learning situations to help achieve desired learning objectives. Teaching materials makes class interesting, learning easy and gives clear concept. A teaching materials compares the principles and methods used by to enable students learning. The selection and use of teaching method of instructional method plays vital role for achievement of mathematics learning. Teaching materials is very important in learning geometry.

"Teacher use only chalk, duster and text book him never use multimedia, solid materialsTeacher don't use any teaching materials. He came to class and Always he focus on text book"

(Student)

"I do not get teaching training related to teaching materials also I am not familiar to ICT. I thought that it was wasting time. I have to finish my course in recommended time.

(Teacher)

"Teaching materials are very useful in learning process but teacher didn't want to use it, he said that using teaching materials are waste of time."

(Head Teacher)

The cause of difficulties in geometry is; teacher has not well knowledge of using teaching materials. He thought that using of teaching materials are west of time, He used to focus lecture method in geometry teaching. Evaluate students by giving classwork and homework.

Classroom Practice

Classroom practice plays vital role in learning process. It follows learner to test their ability to apply the skill that they learned now and novel situation. Sometimes students feel confuse of any mathematics content at that time classroom practices is very useful.

Practice is the most important to learning that effect the achievement in mathematics. For this researcher had taken interview to student and teacher.

"Teacher can't sufficient time to provide classroom practice because there are more students. Some time he asked some question of related topic."

(Student)

"We have certain time period for complete mathematics course. There are a lot of students, so, it's not possible to conduct instruction learning in their own places and discuss."

(Teacher)

"I observed the class each weak. That time I saw must the student are participated in active. We don't have any complain about students and teacher classroom practice till"

(Head Teacher)

The above view indicates that practice of students played most important role in the learning of geometry concept. Due to the home problems of students, Teacher used traditional teaching method, lack of time period of mathematics class, and lack of motivational teaching students not able to more practice of geometry problems. So, Students faced difficulties in geometry.

Home Environment

The terms home environment indicates educational atmosphere in students home. Home is the first school of children. Family is foundation of life and education. Achievement of geometry are affected by background of their home environments. Educated parents can provided such an environment that suits best for academic success of their children. The academic performance of students heavily depends upon the parental involvementin their academic activities to attain higher quality of success in life.

"My parents go to the work out in the field and that time I have contributed my family by working in the field sometimes as carrying goods. So, I didn't get opportunity to study at home"

(Student)

"Majority of the tharu students are poor family so they are reeling throughout the academic year, they spend much time by working at home, so they cannot manage time for learning. Parents are illiterate and they weren't aware of children's study." (Teacher)

"We have the students from different ethnic group most of the students are from middle-class and lower class, but majority of the tharu students from lower-class. There is a co-operative environment in school but in home they could not have time for study because of household works.' (Head Teacher)

It is an important factor of student achievement. Mathematics need practice, so learning of mathematics (geometry), students should manage extra time for practice. The above view indicates that, most of the time they were working, they hardly get rest of time of heavy work load. So the tharu students feel difficulties in learning geometry**.**

Chapter V

FINDINGS, CONCLUSION AND IMPLICATION

This chapter deals with summary, major finding, conclusion and Recommendation.

Findings of the Study

The main purpose of this study was to identify the learning difficulties faced by Tharu students in learning geometry and affected factors which involves creating difficulties in geometry.

From the collected data it was found that the students and teachers have been facing lots of difficulties in geometry teaching and learning of secondary level. The recorded information was analyzed and obtain the following finding:

- Most of the Tharu students can't solve geometrical problems or theorem completely by using theoretical or experimental method with suitable reason. They are also unable to construct parallelogram of given measurement.
- Teacher didn't use teaching materials in mathematics because they hadn't taken any formal training about teaching method and materials. There is only use of the teacher centered method.
- Most of Tharu parents were illiterate and they use their children as a means of earning to support their family, so they cannot manage their study.
- Household work becomes one of the burning problems for the students to study.
- Tharu students and their teacher relation do not see to dependable and cooperative to each other also tharu students do not get encourage and motivation at home and school.
- Home environment parent's education, poverty, lack of student's hour, behavior of the parents were the causes of low achievement.

Conclusion

The researcher concluded that the difficulties faced by Tharu students in learning geometry from the sample school, analyzing with the themes. It becomes the focal point that has affected the everyday life of Tharu students. Comparing to other students of Tharu students, they are many factor that affect mathematics achievement of Tharu students. The teacher seems to be unable to maintain indifferences and promote Tharu students in teaching learning activities. Teacher's classroom behavior, illiterate parents, economic status, interest of learner, assessment technique, teacher students relation, culture they followed, learning environment at home, less participation in learning activities were the causes of difficulties face by Tharu students in learning geometry.

Tharu students have difficulties related to theorem, construction. Students have weak background. Teacher have no training for the development of appropriate teaching method and materials. They only use traditional method to teach geometry. Students also faced problem related to method and material, evaluation technique but they have little problem on classroom practice and interactions.

I concluded that students can learn geometry easily when teacher uses teaching materials and teaching method, given pre-knowledge before start new topic, keep positive relation students and student's family. Family also giving motivational support and academic support to her child.

Recommendations

Based on the finding of this study, the following recommendation are made fo students, parents, teacher and farther researcher.

- To finding learning difficulties on other particular topic of mathematics.
- Similarly study can be carried out in private school.
- Further study can be done on "difficulties faced tharu students in lower secondary level."
- It can helpful to exploring difficulties in other special group of community.
- The government should take as a matter of urgency sent mathematics teacher training and seminars for effective teaching of mathematics and geometry in particular in secondary school.

- This study was only in Janata Sanskrit Secondary School Tulsipur 18 Bijauri Dang as acase for the generalization of result of the study similarly study should be done in large sample

Educational Implications

It is clear from above discussion Tharu students are likely need special treatment in geometry. If it is not done, the students are likely to become progressively more confuse and the students cannot survive in post-secondary mathematics programmers. On the basis of the finding of this research the following suggestions have made for further research.

- The teacher should use students' central method for teaching and his role as a facilitator.
- This study helps to identify the causes of student's difficulties in geometry, so this study might be help parents and teacher to reduce this cause.
- Students should be given enough opportunity to do regular problems as this will support them to increasing their conceptual and procedural skill.
- School Administration and curriculum designer help to how to increase difficulties in Tharu community student's in learning geometry.
- Teacher should motivate the weak students and praise them to participate in teaching learning activities.
- Teacher should be encourage for making and using the teaching materials.
- Learner should be given enough opportunity to do regular exercise as this increasing their reasoning skill.

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Appendix-A

Subject: Mathematics   **Grade: X**   **Time: 1 hour**

Experimental verification/ visualization

1) (A) Write T for true statement and F for false statement.

    I) Central angle is half of Inscribed angle (……)

    II) Central angle is double of Inscribed angle (……)

    III) Central angle and Inscribed angle are equal (……)

    IV) Sum of central angle and inscribed angles are always equal (……)

  (B) Verified experimentally the statements "The opposite angles of the cycle quadrilateral are supplementary."

Construction

2) (A) Construction a parallelogram ABCD such that AB=8cm, AD=5cm, and $\angle A = 75$

  (B) Construct a parallelogram ABCD in which AB=6cm, BC=4cm, and $\angle BAD = 60$, Then construct a triangle AEF equal to the parallelogram having a side Ae=7.5cm.

Theoretical Proof (Formal Deduction)

3) (A) If a triangle and parallelogram are on same base and between same parallels, then the area of triangle is half of area of parallelogram.

(B) Prove that the parallelograms on the same base and between the same parallels are equal in

area.

Reasoning/Application

4) Find x and y
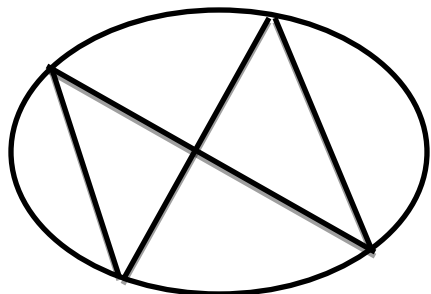
Appendix-B

Interview Guidelines for Students

Name: Address:

Class: Age:

Gender:

The interview with students was conducted on the basis of interview

Guideline:

- Pre-knowledge, understanding of students geometry
- Encouragement providing by teacher, teacher students interaction.
- Teacher's behavior in the teaching learning period.
- Teaching method and materials.
- Tharu student's relation with mathematics teacher.
- Learning environment of classroom.
- Difficulties faced on geometry learning.
- Opportunity to learn at home.

Appendix-C

Interview Guidelines for Mathematics Teacher

Name: Address:

Qualification: Age:

Gender:

The interview with teacher was conducted on the basis of following interview guidelines:

- Lesson plan, teaching strategies, materials for geometry teaching.

- Encouragement and motivation in geometry class.

- Requirements of pre-knowledge of geometry teaching.

- Provision of class work and homework.

- Reinforcement, feedback provided by mathematics teacher to their geometry class.

- Learning environment in the classroom

- Opportunities for participating on training and workshop.

- Use of materials in geometry teaching.

- Teaching Strategies to Tharu students.

- Teacher view of Tharu students.

- Teaching and learning practices environment in the school.

- Relationship with guardians.

Appendix-D

Interview Guidelines for Head Teacher

Name: Age:

Qualification: Address:

Gender:

The interview with head teacher was conducted on the basis of following interviews guidelines:

- Teaching strategies to Tharu students.
- Problems in teaching Tharu students.
- Encouragement and motivation to the Tharu students.
- Participation of students.
- Teaching learning environment at school.
- Teacher learning environment at home.
- Relation between teacher and tharu students.
- Requirement of pre-knowledge of students.