

Chapter I

Introduction

Background of Study

Geometry is one of the most useful and important branch of mathematics. Geometry includes an enormous range of ideas and can view in many different ways. It has been interlocked with many other subjects and different views of human activities. The basic ideas of a mathematical system originated in geometry. Kelly and Ladd (1986) write, “it is not certain who first had seen of trying to prove a mathematical rule by reasoning rather by testing it in different ways”. The word geometry is derived from the Greek words, geo metria which means measuring of 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 arts as well the needs that arose to understand and came to further the legacy of art, architecture, surveying, measurement etc. provides the stimulators the development of science of geometry” (Betler and Wren, 1941).

Geometry concept had developed from the beginning of the civilization. It is evident that the Egyptians must have the knowledge of many geometric principles. Application of these principles had found in the buildings of pyramids and the great sphinx (400-3000BC). The irrigation system devised by the early Egyptians indicate that they had an adequate knowledge of geometry applied in land surveying. The Babylonians were using geometric figures in the tiles walls and decorations of their temples. School mathematics curricula of Nepal have given emphasis on geometry learning from the beginning of schooling.

The curriculum have aimed to develop students understanding of intended geometric concepts at primary, lower secondary and secondary level. Similarly, geometry is one of the content standards of school mathematics, which aims at developing special reasoning, problem solving skills and communicating. Moreover, about the importance of thinking skills in geometry. 'A vision for school geometry (2005) writes, "reasoning is fundamental to mathematical activity." Active learner's questions, examine, conjecture and experiment. Mathematics programs should provide opportunities for learners to develop and employ their reasoning skills. Learners need varied experiences to constructs a problems setting *and* to evaluate the arguments of others (A vision for school geometry, 2005). Thus geometry is regarded as core content area of school mathematics programme. It is the most important and integral part of school mathematics curriculum showing the importance of geometry, Vance (1973) writes it is a way of modeling our physical environment and because there is a great abundance of models suitable for all levels.

Problems relating to geometry learning might have affected the achievement in teaching of mathematics. This is the great challenge to the mathematics teacher. Some problems of learning geometry in students might directly be related to the teacher's academic background, classroom practices, school management, leadership and others. Such situation might affect the efficiency and potentiality of students performance (Basnet, 2001).

There are various researches about teachers and students problems. Many government and non-government official research indicate the investment of huge amount of time and money to find the problems of teachers and students. But

satisfactory result was not found. Hence no successful solution can be found to address the students so many problems that are occurring frequently.

From the above study, it is usually seen that those students and teachers who are the users of mathematics curriculum are facing with the following problems to deal other sources of problems in the implementation of mathematics curriculum. They are the problems related to teaching learning activities, physical facilities, classroom management, and unavailability of instructional materials and lack of knowledge of how to use it, pre knowledge/background of the pupil, economic factors and evaluation system.

About the modern mathematics classroom, Bhatia and Bhatia (1987) said that the teacher's tools have long consisted of chalk, blackboard, pencil and text book. However, today is to use demonstration models of various shape and size, drawing Instruments, graph stencils, measuring instruments, many pictures pamphlets, books and mathematical magazines. Films, slides, manipulative are being used in teaching mathematics in the modern classroom. But the learning in Nepalese schools is totally based on textbooks.

Since the text books have been written in formal Nepali language. It is more difficult for those students who have other language speaking background than Nepali on the other hand the teachers the textbooks as an ultimate means of teaching that do not provide the opportunity of relating their learning with local context because of financial problem. Nepalese schools could not provide money to spend in materials and equipments. Some schools do not have enough classrooms. A large number of students are packed in a small classroom. Thus the crowded classroom is one of the major problems of implementing interactive teaching and learning situation.

Classroom is not well lighted and well ventilated. Physical facility such as teaching materials, mathematics lab, computer and collection of low cost and cost free materials that are essential for teaching and learning activities has not organized properly by concerned agencies.

Statement of the Problem

Mathematics is taken as a difficult subject by most of the students in secondary schools as shown by the results of SLC examination hold every year. But, the contradicting fact is that the number of students scoring A+ is the largest in comparison to that of the other subjects (SLC result, 2073). On the other hand the largest number of students failed in the same subject. Why is this being controversial matter? Why student has not equal capacity to learn? Why is it a phenomena? Brunner says that all student can learn mathematics, but all student achievement of the mathematics is low in the comparative of the others chapter such as mensuration and algebra. Is it really difficult to maintain the good achievement in the geometry? To carry out the research is intended.

In addition, the failure students take geometry as the most difficult part of mathematics. Thus, this study aims to reach the answer of the prime question why is geometry difficult for students?

The new curriculum of mathematics (Geometry) in secondary level has been implemented in Nepali curriculum. The students in average have become under the achievement. So it is well appropriate to discuss about the teaching and learning problems facing by students and teachers to improve the condition of teaching and learning geometry. This study should to answer the following research questions.

- What are the difficulties faced by the students in learning geometry?
- What are the causes of difficulties in learning geometry?

Objectives of the Study

The objectives of the study were as follow:

- To find the difficulties faced by the students in learning geometry.
- To find the causes of difficulties in learning geometry.

Significance of Study

Mathematics is an essential part of school curriculum of Nepal. It has been shown as compulsory subject at all level of school education program. Mathematics is also included as optional subject at secondary level education. Although mathematics has given an important place in the curriculum of all levels of school education. Most of the students are weak in mathematics and hence it is felt that most of the students dislike mathematics and afraid of it. The result of S.L.C. examination shows that most of the failures were in mathematics.

There may be many factors that hinder students' progress in this subject. Most of the teachers and students take geometry as difficult and abstract subject. Most of the teachers give low priority to geometry teaching from the lower classes. As a result, most of the students lose their interest in learning geometry and they have poor motivation in geometry classes. Most of the students have fear and hate geometry because of wrong impression about the need of geometry.

There are various reasons behind this research work as lack of physical facilities which are essential for teaching learning activities, unavailability of experienced and trained mathematics teachers in various schools, unavailability of textbook in time, print mistakes in textbook, lack of instructional materials, unavailability of teacher's guide, large size of class, heterogeneity of the students, inability of the students in subjects inspired me to conduct the research problem might

have arise because of the confusion about the subject matter. Problems also has been aroused due to the lack of knowledge about the proper class management.

In this research the learning problems being faced by the mathematics students and teachers were the main focuses of the study. Therefore, this study will provide some logical and valuable information about the current problem of mathematics with the following significance.

- This study will help the mathematics teacher to understand the gap of the student and apply in the teaching learning activities.
- This study certainly improved the mathematics problem by means and ways that one being faced by students.
- This study can help the successful implementation of the mathematics curriculum.
- This study can helps to create sound environment to student and teacher.
- This study set up the implementation of mathematics curriculum in the present context and may be ground for the further researchers in this issue.

The most significance aspect of this study was to be sure whether the mathematics students face only academic problems or other problems also.

Delimitation of the Study

Each study is no rigorously perfect and free from limitations. So there are lots of factors affecting the teaching and learning geometry. So this study had following delimitations:

-) This study has limited at Janasewa Secondary School, Kirtipur.
-) This study has concerned with only the problems faced by the students in learning geometry.
-) The study has concerned with only those students who were studying grade X.

Operational Definition of Terms

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

Community school. Community schools are those schools, which receive regular logistic and financial support from the government.

Students.In this study student means those who involve in learning secondary level school mathematics.

Problems.The problem as any statements have solutions. Problems are that thing which is difficult to deal with or to understand during learning mathematics.

Supervisors.The authorized person from District Education Office evaluating supervision on the schools activities and giving counseling to teachers as well as head teacher is termed as supervisors.

Learning Problems.Learning problems are the obstacles of the students which, mostly influenced by unfavorable environment, understanding level, assimilation and pre-knowledge of students.

Students Activities.In this study, students performing behavior in mathematics classroom are taken as students' activities.

School Environment.In this study, School environment means the environment of the mathematics classroom.

Trained Teachers.Trained Teacher means those teachers who have got any type of training related to academic field at least six month and the remaining are categorized as untrained teacher for the purpose of this study.

Chapter II

Review of the Related Literature

It is an essential to review the related literature to compare the study which provides strong knowledge about the related topic. Number of books research reports papers and other booklets can be concerned with curriculum, teaching materials, methods and so on. However, the researcher could not find any investigation on the students difficulties in learning school geometry in mathematics at grade X. The researcher has reviewed some related literature as follows:

Empirical Literatures

Usiskin (1982) studied of "Van Hiele's level and achievement in secondary school geometry". He developed a multiple choice test to measure a student's Van Hiele's level of reasoning he wanted to find out if these test could at all predict student's achievement in geometry. He tested 2699, 10th grade students and looked Boys score significantly higher than girls, level 5 does not testable. All other levels are testable and also Van Hiele's level is very good predictor for multiple choice test of geometry content.

Lamichhane (2001), did a descriptive survey type research on "A study of problems faced by the secondary level mathematics teacher's in teaching mathematics "with the main objective to identify the problems being faced by the secondary level mathematics teacher's in teaching mathematics and to compare those problems in the rural urban areas. He concluded that several problems proposed up in the eyes of the teachers such as in an inadequacy of textbook and teacher's guide, lack of instructional materials, teacher training, lack of supervising, lack of physical facilities and lack of motivation to learn mathematics is poor on the part of students are the key problems faced in Teaching mathematics.

Similarly, Bhattarai (2005), made a study entitled "A study on problems faced by the mathematics students in existing curriculum". He concluded that learning mathematics in secondary level was distributed by so many factors such as: lack of teacher's involvement in curriculum planning, differential and instructional facilities and aids students with weak background in the subject matter, student's defective promotion. Policy lack of opportunity given to upgrade their knowledge and huge number of personal problem of the students and teachers.

Genj (2006) conducted a thesis entitled "Determining High School Geometry students' Geometric Understanding Using Van Hiele Levels: Is there a difference between standards-based curriculum students and non-standard based curriculum students? The objective of this study was to find out difference between standards-based curriculum students and non-standard based curriculum. Using van Hiele levels, this study examines 20 ninth-grade students' levels of geometric understanding at the beginning of their high school geometry course. Ten of the students had been taught mathematics using a Standards-based curriculum, the Connected Mathematics Project (CMP), during grades 6, 7, and 8, and the remaining 10 students had been taught from a traditional curriculum in grades 6, 7, and 8. Students with a Connected Mathematics project background tended to show higher levels of geometric understanding students with a more traditional curriculum (NON cmp) background.

Poudel (2007), did a study on "problem faced by lower secondary mathematics teacher in teaching geometry" with the aims to identify the problems faced by lower secondary level mathematics teacher in teaching geometry related to curriculum. He concluded that the geometry teaching learning isn't effective because of curriculum, textbook, physical facilities, teaching learning activities, materials, methods and students evaluation techniques. Moreover, both trained and untrained

teachers are similar problems like crowded numbers of students, lack of math's lab, poor evaluation process. Negative attitude toward geometry is also psychological problems.

Atebe (2008) conducted a thesis entitled "Students Van hiele's Level of Geometric Thought Conception in Plane Geometry". This study had three goals, out of which the main objective was to explore and determine the Van Hiele levels of geometric thinking of selected grade 10, 11, 12 learners in Nigeria and South Africa. Using both purposive and stratified sampling, 144 mathematician learners from 10, 11, 12 in Nigeria and South Africa school and 6 mathematics teachers from Nigeria and South Africa were selected. The whole process of analyzing the classroom videos involved a consultative panel of 4 observers and 3 critical readers, using the checklist of Van Hiele phase descriptors to guide the analysis process. Concerning learners' levels of geometric conceptualization, the results from this study revealed that the most of the learners were not yet ready for the formal deductive study of school geometry, as only 2% and 3% of them were respectively at Van Hiele levels 3 and 4, while 47%, 22% and 24% were at levels 0, 1 and 2, respectively.

Shah (2008), conducted his research on the topic "A study on problems faced by students and teachers in teaching -learning of vector " then he concluded that government schools don't have sufficient mathematical materials, lack of protection topics, lack of motivation and encouragement to student. These are the causes that makes teaching learning vector in effective.

Gyawali (2009) did a thesis on the title "Effectiveness of Van Hiele approach in teaching Geometry at Secondary Level". He selected the sample consisting of forty students purposively from Nawalparasi district. He taught the experimental group by employing Van Hiele approach and the control group by conventional approach. His

result also revealed that the mean score of the students of the students of the experimental group was greater than that of the control group. Thus he concluded that Van Hiele approach is effective in teaching geometry than the conventional approach.

KC (2009) conduct a thesis "A study of problem faced by students in compulsory mathematics at secondary level". The nature of this study was quantities as well as qualitative. This study followed survey design. He selected six schools from urban area of Lamjung district randomly. Among them three were private and three were government schools. From each school, one mathematics teacher and three mathematics students of grade X were selected as a sample for the study. For the data collection, a set of class observation from and interview schedule were used. The obtained data was analyzed and interpreted with the help of mean weight age.

Connolly (2010) conducted a research work on " The impact of Van Hiele geometry instruction on student understanding" its objective was to find out the impact of van hiele best geometry instruction on student understanding. Using inducting and deducting method. He completed the study moreover. Forty-three students enrolled in the high school Regents Geometry course received instruction using the newly developed materials. The results of these students showed improvement over the results of the previous year's students under more traditional Geometry instruction.

Bhatta (2013), did a survey study on "problems faced by the students in geometry at secondary level of Kailali district." The researcher developed the questionnaire, observation from and interview schedule under the guidance of supervisor and researcher added some problems himself with advice of experienced mathematics teacher. The main purpose of the study is to identify the problems faced the mathematics students in geometry at secondary level of Kailali district. The

researcher has presented recommendation that will be benefited to the concerned authority further improvement in the geometry teaching. The problems aroused teaching learning activities, instructional materials, and evaluation system. From the above stated findings of this study, it can be concluded that teaching and learning of geometry was not satisfactory in Kailai district.

Kekana (2016) Conducted a thesis entitled "Using Geogebra in transformation geometry a investigation based on the van hiele model " the aim of this study was to investigate on a small scale the potential of the use of Geogebra in teaching and learning of transformation geometry to grade 9 learners. Using mixed method for this research and 4 publics' school selected by purposive sampling methods. Grades 9 learners are population for this study. Data collection tools were interviews, questionnaire, observation, and survey paper and pencil test. The results are presented in accordance with pre –determined themes as mentioned earlier in the dissertation which are teacher and learners backgrounds their views on the use of Geogebra, usage of Geogebra, as well as their evaluation of Geogebra.

Rizo (2016) Conducted a thesis entitled "The effect of using van hiele's instructional model in the teaching of congruent triangles in grade 10 in Gauteng high schools "the aim of the research work is to inquire the possible effect of teaching geometrical congruency to study participants who are in grade 10 in some of the Gauteng high schools using van hiele's instructional model. Grade 10 learners are population for this study and three randomly selected high schools in Gauteng formed the research field while intact groups of grade 10 learners in these schools formed the study participants (136 learners) for the study. Using mixed method for this research. Data collection tool are classroom test, (pre and post test) and video record and note pads. the results that emerged from this study suggest that if the van hiele

instructional model is affected in teaching of congruency of triangles in the grade 10 mathematics classroom it may facilitated the process of learning the concepts taught and improve the achievement scores of the learners.

After studying the overall literature, the researcher has found many more problems related to the teaching mathematics. But the researcher found that some of the issues are nor getting sufficient result as the information. Therefore, determining the gap and finding out the solution of the student difficulties in learning geometry has selected as the research topic.

Theoretical Review

Two Dutch educators, Dina and Pierre Van Hiele, suggested that children may learn geometry along the lines of a structure for reasoning that they developed in the 1950, educators in the former Soviet Union learned of the Van Hiele's research and changed their geometry curriculum in the 1950s. During the 1980, there was interest in the United States in Van Hiele's contributions of the National Council of Teachers Mathematics (1989) bought the Van Hiele's model of learning closer to implementation by stressing the importance of sequential learning and an activity approach?

The Van-Hiele's theory (1986) is a learning model that describes the geometric thinking of students through as they move from holistic perception of geometric shapes to a refined understanding of geometric proof. Van-Hiele's and his wife Dina M. Van-Hiele's developed this theory out of the frustrations both they and their students experienced with the teaching and learning of geometry. Van-Hiele's (1986) explains that when teaching his students geometry. It always seemed as though I were speaking a different language.

Van-Hiele's wanted to know why students experienced difficulty in learning geometry and how he could remedy those difficulties. The solutions Van-Hiele's found for students that frustration was the theory of different levels of thing. . The five learners of geometry thought did not correspond with student's age. As students develop the cognitive skill necessary to master one level, they progress to the next. The mental development levels of instruction as suggested by Van Hiele's theory has been given below:

Level (1): Visualization

Students recognize figures by appearance alone, often by comparing them to a known prototype. The properties of a figure are not perceived. At this level, students make decisions based on perception, not reasoning.

Level (2): Analysis

In this stage the students analyze the attributes of shapes and the relationship among the attributes shapes and discovers properties and rules through observations.

Level (3): Informal Deduction

In informal deduction the student discover and formulates generalizations about previously learned properties and rules and develops informal arguments to show these generalizations to be true.

Level (4): Formal Deduction

In this stage the students prove the theorems deductively and understand the structure of the geometric system.

Level (5): Rigor

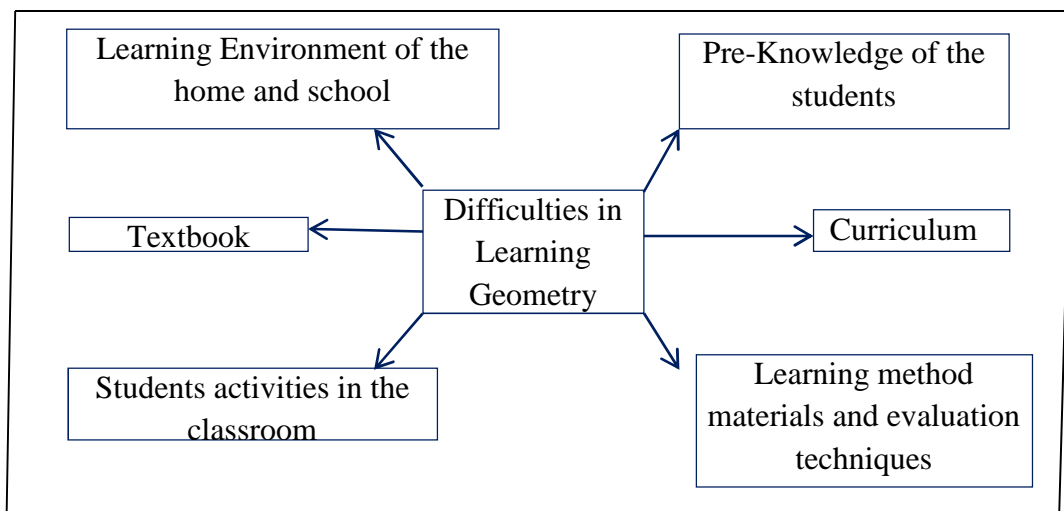
In this stage the student establishes in different systems of postulates and compares and analyzes deductive system.

The best known part of the van Hiele model are the five levels which the van Hieles postulated to describe how children learn to reason in geometry. Students cannot be expected to prove geometric theorems until they have built up an extensive understanding of the systems of relationships between geometric ideas. These systems cannot be learned by rote, but must be developed through familiarity by experiencing numerous examples and counterexamples, the various properties of geometric figures, the relationships between the properties, and how these properties are ordered. The five levels postulated by the van Hieles describe how students advance through this understanding.

Conceptual framework

A conceptual framework is an analytical tool with several variations and contexts. It is used to make conceptual distinctions and organize ideas. Strong conceptual frameworks capture something real and do this in a way that is easy to remember and apply.

Fig: 2.1
Conceptual Framework of the Study



Source: Shah, D.P. (2008)

From above discussed point of views in related literature, problems of teaching and learning mathematics in geometry may depend upon different variables.

These variables affecting students learning process in geometry are teachers and students interaction, students involvement, curriculum, textbook, teachers and students behaviors homework, class work regularity, the major factor of teachers and students activities, pre-knowledge, environmental variables.

Such as study time at home, attitude of parents, physical, surroundings, adequate, furniture, appropriate room, significant on teaching and learning, it analyzes teaching method, use of instructional materials, use of teachers guide lesson plans and unit test, class test, etc.

Likewise, theories help for systematic research on the problems of teaching and learning geometry. The van Hiele model suggests that learners advance through levels of thought in geometry. Van Hiele characterized these levels as visual, descriptive, abstract and formal deduction. At the first level, students identify shapes and figures according to their concrete examples. At the second level, students identify shapes according to their properties. At the third level, student can identify relationship between classes of figures and can discover properties of classes of figure by simple logical deduction. At the fourth level, student can produce a short sequence of statements to logically justify a conclusion and can understand that deduction is the method of establishing geometric truth according to this model, progress from one of Van Hiele's levels to the next is more dependent upon teaching method than one age.

The student learns by rote to operate with relations that he does not understand, and of which he has not seen the origin. Therefore the system of relations is an independent construction having no rapport with other experiences of the child. This means that the student knows only what has been taught to him and what has been deduced from it. He has not learned to establish connections between the system

and the sensory world. He will not know how to apply what he has learned in a new situation.

Geometry teaching cannot be learned by rote, but must be developed through familiarity by experiencing numerous examples and counterexamples, the various properties of geometric figures helps the relationships 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, administrative authorities, and curriculum.

Chapter III

Methods and Procedures

This chapter presents the research method of study which was determined how the research becomes complete and systematic. This study has concerned with the students difficulties in learning school geometry. The major procedures have been followed by this study has as follows:

Design of the Study

Case study methodology is becoming increasingly influential in educational research. Case study research method focus in the small group of sample and in depth study can act in the same group. So find out research activities researcher chose the case study research design.

This study has based on case study designing in qualitative approach. Qualitative research methodology deals with the collection of information formally and informally and using themes to draw conclusion about the views and attributes of people. This approach to research involved the exploration and interpretation of the perceptions, opinions, aspirations, behaviors, concerns, motivation, culture, or lifestyles of small samples of individuals. Hence, qualitative research analysis has explore the issues from the existing environment, understands and interprets the ongoing phenomenon and answers the aroused questions.

This study has concerned on student's difficulties in learning school geometry in secondary level. The data for my research has in descriptive from rather than numerical or inferential. Teachers, students, head teacher, parents' views and mathematics classroom observation has the prime data for my research. Therefore, the researcher had try to explore the interaction between teacher and students teaching -

learning activities and students, pre knowledge regarding geometry in mathematics classroom in Janasewa Secondary School, Kirtipur.

Selection of the Study Area

There are many government secondary schools in Kathmandu district. For the purpose of complete my research, the research site had Janasewa Secondary School, Kirtipur at grade ten. Therefore, this study has focus on exploring the problems of learning of secondary level in grade X.

Sample of the Study

In order to collect the sample, to identify the difficulties in Geometry learning, the researcher purposively selected and took interview with 1 head-teacher, 2 mathematics teachers, 5 parent and 8 students from a school, who studied compulsory mathematics at grade ten. The selection sample of the study was different ethnic, castes, genders etc.

Tools for the Study

The main tools used in to collect primary data was observation and interview formats.

Observation Form

During the five days classroom observations, I observed seating structure, teacher activities, student's response and activities. In this period the considerations made not to disturb the natural setting inside the classroom. The main purpose of the classroom observation has to find out the problems of geometry teaching and learning in the context of mathematics. I requested to teacher for observing their class but I did not clarify about my research purpose to ensure the trustworthiness of my study. To get required information, the researcher used the diary and observational notes.

Interview Schedule

Discussion of qualitative research interviews has centered on promoting an ideal interactional style and articulating the researcher behavior by which this might be realized. Interview with stakeholders are one-to-one conversations about a specific topic or issue. The main aim of this interview was to explore the problems faced by students in learning geometry as well as to explore the problems faced by teachers in teaching geometry.

Validity and Reliability of Tools

The validity and reliability are the necessary qualities of research instrument, for the semi-structure interview, validity has established by subject expert and supervisor whereas the reliability of the interview has 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 and semi-structured question sets has prepared. The interviews of teachers, students and parents participants are one-one in-depth and conducted at multiple levels until the data are saturated.

Researcher has took interview with 8 students, 5 parents, 2 mathematics teachers and 1 head teacher from Janasewa Secondary School, Panga Kirtipur, Kathmandu. 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 Procedures

At first the researcher has visit to the selected qualitative data on the basis of the observation from the students of grade ten was observed for five days. In that period researcher observed carefully and note and every activity of students and teachers in dairy. Also, the researcher was took face-face interview with the head

teacher, the mathematics teachers, students and the parents of case students with help of guidelines of open structured interview formats. The researcher had listened to the replies of respondents curiously and note actually. Therefore, the researcher has record the behaviors and activities of the teacher and students during teaching - learning activities, mathematics teacher, parents and students interviewed; all the answers has noted during the course of interview with teaching -learning environment has analyzed.

Data Analysis Procedures

In this study researcher used the observation form to analysis the data. Data from the observation form and the data from the open ended questionnaire are the main tool to find out the solution of the study. Data has carried out from the field. Regular thematic note also has developed. From the data of observation form, theory and in-depth interview has triangulated and analyzed. To generalized the data the expert advice and friends advice also taken. To complete the research interview with the related person also has taken.

The triangulation process between the data from the primary three sources such as observation form, interview and theory has tally and if the data are cross match than researcher conclude that the student were filling difficult to learn or not. Same process had done by the researcher and carry out the result.

Chapter IV

Analysis and interpretation

Data analysis and interpretation is the process of assigning meaning to the collected information and determining the conclusions, significance and implication of the findings. The steps involved in data analysis are function of the type of information collected; however, returning to the purpose of the research and the research questions provide a structure for the organization of the data and a focus for the analysis.

The data were collected for the study from four secondary schools of Kathmandu selected by purposively. The data was collected using interview schedule and class observation form. The collected data were tabulate and analyzed according to objective of study. The obtained data were analyzed and interpreted by using descriptive method.

The collected data were analyzed under the following main headings which relates to the conceptual framework and objective of the study.

-) Pre-Knowledge of the students
-) Learning method material and evaluation techniques
-) Textbook
-) Curriculum
-) Students activities in the classroom
-) Learning Environment of the home and school

Now, here researcher described about the given above headings according to collected data which are collected by head teacher, Mathematics teacher, parents and students using interview and class observation form.

Problem Related to Pre Knowledge of the students

Mathematics is abstract subject. It has many facts, theory and other conceptual understanding. The basic knowledge or pre-knowledge of lower grade is the key factors to affect the present grade. Prior knowledge is base also important potential determinant of later performance of students.

Pre knowledge is the most important to learning that effect the achievement in mathematics. For this researcher had taken interviews to mathematics teacher and students

Does pre knowledge and skill affect the achievements in mathematics?

"Mathematics is tedious and hard subject without pre knowledge and skill of basic concept of mathematics, Most of the students poor in mathematics. They have no pre-Knowledge about mathematical skills and concept. In this condition how to better result achieved". (Mathematics Teacher)

"Yes, most of the student who get poor marks in previous class they don't interest in mathematics because they have not pre knowledge of mathematics and who get good marks in previous class they have pre knowledge and skill of connection to problems give interest and participation in teaching activities" (Mathematics Teacher)

Most of the teacher's views get there is a poor situation of pre knowledge of students between past to present time. Now students have problems in mathematics learning because of poor understanding not skill of concept from their previous grade.

"We study geometry in earlier classes. In that class we did not study geometry well and teacher also did not encourage to us to learn geometry. They did not tell about importance of geometry in higher class. So we, are very weak in geometry

portion. Even we can't distinguish perpendicular, angles, related terms for the theorem of the circle and rectangle." (Student)

The above views indicate that pre knowledge of students played most important role in the learning of new concept. But, most of the students don't have pre knowledge and skill of connection to related theorem in problems of geometry. Similarly different researcher shown skill and pre knowledge affects the student's achievements on mathematics. In the new topics teacher not taught according the required pre knowledge.

"Most of the previous academic year, teacher taught geometry at the sessions of the year. Due to the final examination, teacher finished the geometric part fast". (Students)

From the mentioned above due to the poor pre knowledge of students in geometry teachers has faced problem to teach geometry. Most students have faced problem in geometric portion of mathematics. The main cause of students is the bad feeling toward geometry that it is hard subject. Similarly lack of motivation and encouraging to students are not well participated in active learning.

Problems Related to Teaching Method, Materials and Evaluation Techniques

To make teaching learning activities effective and meaningful, use of teaching method, instructional materials and Evaluation techniques are indispensable. Different kinds of teaching methods like discussion, lecture, problem solving can be used in teaching geometry. Similarly audiovisual aids, models, computer are used for teaching materials in effective geometry learning. Above teaching methods and materials could be used in classroom to facilitate teaching learning situation. These factors are strong weapon to motivate the class. To minimize the geometrical problems all sorts of teaching method and instructional materials can be adopted.

Similarly classroom evaluation, monthly test, practical, open book test, terminal test, homework checkup are also essential factor to make geometry leaning is effective. Here researcher took interview to find relation between learning method, materials and evaluation techniques with effectiveness of geometry learning.

"There is one way traditional teaching and boring theorems in the geometry class. There is no any sufficient multimedia and books about the geometry and math. Only geometry box and graph board are used for teaching materials ". (Student)

"About the homework teacher gives us but they won't check regularly. Just they collect it on the end of the chapter/unit. After checked the homework never given feedback. School took exam in every month but we did not get opportunity to review our exam paper". (Student)

From the above mentioned views teacher has not use audio, visual materials as soon as locally available teaching materials. Not well participator approach of both students and teacher in geometry teaching at classroom, lack of diagnostic test, oral test and feedback. Teacher uses lecture method in geometry teaching. Not evaluate students copy by giving class work and homework.

"There is no any facilitator for us who can help us for the use of computers in the classroom teaching in the geometry so not used audio, visual materials. We conduct regular exam on each month. For the weak students we have to conduct the re-exam. This academic year we took 10 exam of geometry". (Math Teacher)

The above mentioned views show that teacher did not apply formative assessment techniques to construct the strong educational background. There are not used sufficient mathematical materials due to the trained technology teacher crisis. There should be separated mathematics lab but it is not found in school. The teacher always promotes lecture method in geometry teaching. There is lack participation of

teacher and students at geometry classes. Teacher do not use child centered approaching and do not evaluates students work properly which is also problem of geometry teaching methods, not using materials not using teachers guide of geometry teaching and lack of formal training to teacher.

Curriculum and Textbook

There is limited participation in designing the mathematics curriculum in Nepal. The local curriculum has not been practiced for school level education yet. Lack of lecture period, disappointing course curriculum are common and recent problems in curriculum designing. The course of geometry is hardly be finished at school level mathematics and there is not allocated specifically teaching hours for preparation and practice. On the basis of these, problems faced by students on curriculum of geometry will be determined.

While interviewing the teacher, Students, mathematics professionals they complained about the complex and larger syllabus in Nepalese secondary level mathematics curriculum. Teachers argued that, though they want to conduct their mathematics teaching in different teaching methodologies, curriculum forces them to follow traditional problem solving Approach. The syllabus usually is very vague and teachers often feel problem to construct mathematics knowledge on students inside the classroom and relate their learning with daily life experiences. Similarly, they even complained about the central tendency of curriculum in which the teachers hardly find their space to contextualize mathematics teaching inside the classroom.

Teachers even hardly get opportunities to build their own syllabus on their own and to choose the textbooks according to the students. Usually the term-wise syllabus breakdown and textbooks are imposed by the different examinations boards

and different clusters of schools. In these situations, it becomes harder for the teachers to implement modern approach in mathematics classroom.

Also often examinations are held from the external authorities and mathematics learning achievements are usually evaluated by the external authorities, mainly based upon marks achieved. Similarly, the evaluation systems primarily focus on problem solving methods. In these situations, the mathematics teacher feel harder to run their class so as to construct mathematics knowledge in students.

Problem Related to Students Activities in Classroom

Classroom is the place of knowledge delivery in formal class education system of our country so if students are actively participating in learning class they gained more knowledge. Similarly, for better learning of geometry students must be actively participate in class work, group discussion, discipline and extra curriculum etc.

"We were involved in group discussion, co-operation with teacher and friends when got confusion in topic although some smarter students made their own groups and they won't involve in our team. Similarly class work was done with obediently. We were raised the question with teacher in problematic matter. Teacher focused to good students only than weak. Teacher didn't use any teaching materials just hypothetically teach and forced us to do home-work". (Student)

"Teacher always emphasis their own method and they also choose the lesson according to their interest. Similarly teacher always emphasis on bookish knowledge and not give many examples for concept in mathematics classroom". (Student)

According to students, classes were not started interestingly; students responded that the teacher didn't give the extra parallel problem of their ability. The weak students didn't get appropriate chance to learn clearly. The teacher didn't

participate with students in classroom activities. Students responded that students feel difficult while proving theorem.

"I give opportunity to asked question about their confusion while teaching but except some students never ask. Similarly I give class work and homework with check up also. Students are poor in pre-knowledge. Most of the students were irregular in class and low interest in learning geometry. I am not using any fixed teaching method for geometrical teaching but my aim is to how children receive the knowledge. Teaching period is short, to finish the course on time but that is impossible with child centered teaching". (Mathematics teacher)

From above views we conclude that most of the teachers are facing various teaching learning problems such as large number of students, different learning capacities of students, students were not interested for their study etc. Although teacher did hard labor to provide quality education.

"I observed the class each week. That time I saw must have the students are participated in active learning only few are making noise. I informed class teacher and suggest for control the class. We don't have any complain about students and teacher class activities till". (Head teacher)

From above views reasons of felling geometry difficulties are lack of motivation in class, lack of practical knowledge about geometry, teacher behavior is not as friendly, lack of awareness of teacher and parents duties to his/her child at home, not well participatory approach of both students and teacher in geometry teaching at class room, lack of preparation and confidence of teacher about the geometry manipulation, due to the lack of training and knowledge about child psychology to mathematics teachers. Similarly lack of interesting way of teaching

geometry and difficulty proving theorems methods are reason of difficulties in learning geometry.

Learning Environment of the Home and Class

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

"My parents go to work out in the field and that time I have contributed my family by working in the field sometimes as carrying goods. So I don't get opportunity to study at home'. Next students "My father helps me in solving in simple mathematics problem". (Students view)

Students were busy in the housework and not time for study. They had poor economic condition. Most of the parents are uneducated so they were not enabling to help their children's problems.

"Majority of the students are poor family so they are reeling throughout the academic year. They work earn money but hampers on their study. Parents are illiterate and they weren't aware of children's study". (Teachers view)

"We have the students from different ethnic group and main stream groups. Most of the students are from the middle-class and lower class few from upper class as well. There is co-operative environment in school and class also". (Head teacher)

This view indicates that parent's poorness and illiteracy hampers her/his

children's education. Poor family students get low opportunity for study and illiterate parents are weren't aware for children's study. In school there is no discrimination.

We can't invest for children's study because of the sources of income is merely enough to fulfill their demand. Similarly we are illiterate so can't help in their learning. Although except sometime most of the days send to school". (Parents view)

This views indicates that low economic condition and illiteracy is one of the major factors and they were unable to teach at home .Similarly student's don't get sufficient time at home to do homework due to household work. It can say home environment influences the performances level of students.

Class Observation Note

Class observation note is note which was prepared by researcher in the base of what researcher seen in natural setting observation. For observation note researcher observed classroom teaching and learning within five days. For this researcher took permission with head teacher and mathematics teacher both. The main purpose of classroom observation was to found out the problems of geometry teaching and learning in the context of mathematics. In this study researcher observed the following areas.

Class Observation Note: 1

S.N.	Observation field	Researcher Note
1	Classroom size	Enough for student
2	Availability desks and benches	not sufficient for the students and not moveable
3	Seat planning of students	There is three columns so difficult for walking while teaching
4	Arrangement of blackboard	Available but not suitable for mathematical solution
5	Student's behavior in classroom	Do not pay attention towards the teacher. Lack of activeness.

From above class note we can concluded that school have problems in size of class, Availability of desks and benches, seat planning, arrangement of blackboard and behavior of student's in classroom. This also effected in the effective geometry learning. Due to the lack of sufficient desk and benches students were sit with. Similarly cause of small white board tedious to write and for teacher and last benches students weren't see perfectly. In this lack of activeness of student's teaching were only teaching but learning is not well.

Class Observation Note: 2

S.N.	Observation field	Researcher Note
1	Teachers and Students interaction in the classroom	Students interact with teacher rarely. They hesitate to ask questions.
2	Regularity of students in mathematics	they do not attend regularly
3	Motivation to the students	lack of motivation
4	Homework and class work practicing/checking conditions	homework and class works are given but not check and given feedback by teachers
5	Coordination with peers and teacher to solve the problems	Lack of coordination with peer and teacher.

From above class observation note researcher claim that teachers and student's relationship are not good. Students are irregular in geometry class and teacher not motivated students for effective learning geometry. Home and class work are given

but not check and given feedback. When students get problem in solving and understanding about geometry students did not show interest in group discussion and asking to teachers they started side talk only.

Class Observation Note: 3

S.N.	Observation field	Note
1	Participating in classroom discussion and extra activities of mathematics	No one is ready to discuss. there is no extra activities
2	Teaching Methods	lecture method and problem solving
3	Teaching Planning	no lesson plan
4	Guidance of teacher during class work	rarely does
5	Students evaluation	They do student evaluation but only summative evaluation not continuous evaluation.

Students were not ready to discussion for any new topic about geometry.

Students and teacher both do not curious about practical use of geometry. Only solve books problem but unknown for use and importance of geometry in human life.

Teacher used old teaching methods like, lecture and problem solving. Teacher did not make lesson plan before went class room thus sometime self confusion about teaching and problems about geometry. Teacher guidance to students seems very rarely.

Student's evolution is not continuous, teacher not used oral question and class question. Evaluation system is fully guided by summative exam only for pass and fail and to get upgrade class certificate.

Chapter-V

Findings, Conclusions, Recommendations and Implication

This chapter represents the summary of the study with major findings and conclusion. Finally, the last section presents recommendations for the further study.

Findings of the Study

On the basis of data analysis and interpretation of the results, the summaries of major findings are as follows:

-) Lack of physically well equipment class, modern technological material and continuous system in teaching geometry
-) The students neglected the daily assignments and the teacher did not check homework in the daily basis as soon as did not give feedback about homework
-) Lack of motivation in the classroom and practical knowledge about geometry
-) Most of the teachers were not able to teach their students in the basis of Van Hiele's five levels though of geometry.
-) The students and teachers were using the particular books beside the curriculum.
-) The poor pre-knowledge of students in geometry, teacher had faced problems to teach geometry.
-) Different dimensions had played the role to occur the problems in the teaching learning process such as not using the locally available teaching material, difficult to convert geometry question in mathematical language.
-) Complex and larger syllabus in secondary level mathematics curriculum also forces teachers to follow traditional problem solving approach in teaching geometry.

-) The cause of problems in learning geometry founded from interview are spending more time on household work, playing, distance between home and school, negligence by teacher to poor students, teaching without providing clear concepts.

Conclusions

The major finding of this study shows that there is made both teacher and students passive agent in dealing with geometry teaching learning. One components of arising problem on teaching-learning process in geometry was the pre-knowledge and poor geometrical background. The traditional teaching strategies in geometry class by both trained and untrained teachers had remained as a main problem. Teachers had not implemented the modern techniques, methods and materials for geometry teaching learning. It seems to be exam oriented rather than its application.

There is lack of students project work on geometry learning. Most of students had less interest in geometry learning. It is difficult to create interest on students because geometry is regarded as abstract subject matters. The students and teacher had faced problems on geometry teaching learning process because of the poor evaluation system, negligence of homework, lack of instructional materials, non-effective teaching -learning management, qualification of parents, home environment to study were some examples. To minimize these problems, there can be continues communication among students, parents, and teachers and the teaching strategy must be students centered.

Implication

Observing the above study, the researcher has presented recommendation which, might benefited to the concerned authority further improvement in the

geometry teaching. The problems aroused teaching learning activities, instructional materials and evaluation system.

-) The contents and methods of teaching should be influenced by some practical motives
-) Use of paradoxes in teaching and learning of mathematics can generate curiosity, increase motivation and create an effective instructional environment.
-) Teacher should be encouraged for making and using the teaching materials.
-) Evaluation system should be more precise and scientific
-) The teacher should motivate the weak students and praise them to participate in teaching learning activities
-) School should need to make mathematics laboratory.
-) Project works should be given to the students in different geometric topics. Workshops on various portions of geometry should be conducted effectively.
-) Administration should be responsible for materials management and their effective uses.
-) The teacher shouldn't make students only busy copying the solved problems from the blackboard; check them whether they are comprehending or not.
-) The classroom should be well arranged so that the students can equally and easily participate in the classroom activities.
-) The school administration should interact with the students, teachers, guardians and other related persons to discuss the problems and come to the solution.
-) Innovative and refreshment training, orientation and supervision should be provided to the teacher time to time.

Recommendations

This study was about student's difficulties in learning school geometry in Kathmandu district. The findings and conclusion of this case study were based on the government school. So, it couldn't be generalized. This study will certainly help to reduce the student's difficulties in geometry teaching and learning in future. This study recommends for further research as following.

-) Similar study should be carried out with a large sample and various schools of different parts of Nepal
-) This kind of studies should also be conducted at all levels of schools and in other areas of mathematics.
-) The similar study should be done in other district of Nepal as well

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Appendix-A

Class Observation Note

The classroom observation note will be prepared on the basis of following indicators being participated with mathematics teacher during teaching learning in geometry.

S.N.	Observation Field	Researcher Note
1	Classroom size	
2	Availability desks and benches	
3	Seat planning of students	
4	Arrangement of blackboard	
5	Student's behavior in classroom	
6	Teachers and Students interaction in the classroom	
7	Regularity of students in mathematics	
8	Motivation to the students	
9	Homework and class work practicing/checking conditions	
10	Coordination with peers and teacher to solve the problems	
11	Participating in classroom discussion and extra activities of mathematics	
12	Teaching Methods	
13	Teaching Planning	
14	Guidance of teacher during class work	
15	Students evaluation	

APPENDIX -B

Interview Guideline for Head-Teacher

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

- Teaching and learning environment of school.
- Instructional material and strategies.
- Techniques and policy of the school
- Parental involvement in school
- Training to mathematics teacher
- Evaluation Techniques learning environment of the school

APPENDIX -C

Interview Guidelines for Mathematics Teachers

The Interview with teachers was conducted on the basis of following main topics:

- Lesson plan, teaching strategies, materials for geometry teaching
- Encouragement and motivation in geometry class
- Requirement of pre knowledge of students for geometry teaching
- Initializing geometry teaching faced problems on geometry teaching
- Class work and home work
- Reinforcement, feedback provided by mathematics teacher to students in geometry class
- Teacher relations with students
- Evaluation Techniques in geometry class
- Learning environment of classroom
- Other special techniques, strategies, activities of teacher while teaching geometry.

APPENDIX -D

Interview Guidelines for students

The interview with students was conducted on the basis of following main topics:

- Punctuality and dedication of teacher and students.
- Encouragement provided to students.
- Pre-knowledge, understanding of students on geometry.
- Teachers' behavior in the teaching learning period.
- Faced problems on geometry learning.
- Class work and home work.
- Punishment and reward etc. Provided by mathematics teacher to students.
- Student's relations with mathematics teacher.
- Participant's students to mathematical exhibition or other activities.
- Evaluation Techniques.
- Learning environment of classroom.
- Learning environment of home.

APPENDIX -E

Interview Guidelines for Parents

The interview with parents was conducted on the basis of following main topics:

- Involvement in school.
- Learning environment of the school, image towards school.
- Interaction, behaviors with teacher.
- Evaluation system of school.
- Responsible and duties for child.
- Learning environment of home.