CHAPTER I

INTRODUCTION

1.1 Background of the Study

Mathematics is a necessity of the civilization. From where and when mathematics began can not be said exactly, but it can be said that mathematics is an integral part of human civilization. Mathematics begins with the origin of the human being. Human beings developed mathematics to fulfill their need. Its form and organizations have developed along with human development. In the primitive age, people developed the sense of number to know the number of their animals and the number of their family. Probably the earliest way of keeping a count was by some simple tally method, employing the principle of one to one correspondence by making collection of sticks, by cutting notches in a piece of wood, by trying knots in a string etc. When the state was established, improved mathematics was needed to find out population, distance, time, shape, count etc. It is said that 'Need is the mother of invention'. In the same way the exciting concepts, relations and theories in mathematics became insufficient. Then the new concepts, principles, theorems and relations were developed. New scopes of mathematics developed. Firstly, for different areas of mathematics, different appropriate mathematical structures such as undefined terms, definition and axioms were developed. Mathematical theorems are the logical outcomes developed from axioms and definition. For example; Euclidean geometry was developed by Euclid by developing mathematical structures. But, Lobachevski developed non Euclidean geometry at 1829 A.D. declaring Euclidean geometry (5^{th} edition) was faulty. Similarly, in course of finding out $\sqrt{-1}$, $i= \sqrt{-1}$ was supposed and complex number theory was developed in the field of mathematics.

The ancient civilizations like Babylonian, Egyptian, Roman, Greek, Arab, Chinese and Hindu have contributed much to mathematics development. Among them, Babylonian civilization is one of the oldest one which existed about 5000 B. C. The mathematical development occurred in the civilization is known from the examples found in different clay tablets found from excavation. Similarly, Egyptian civilization existed from 3200 B.C. to 1000 B.C. Its sources are the

mathematical problems mentioned in the papyrus of that time. The Chinese civilization is one of the ancient civilizations which existed about 3000 B.C. 'Arithmetic in nine sections' is regarded as its sources. Another ancient civilization is the Indian civilization. Its proofs are the findings of excavation of the Mohenjo Dare Urbanization in 5000 B.C. Another ancient civilization is the Greek civilization. Its role in the history of world was very remarkable because a number of philosophers, mathematicians, politicians were born here. Therefore, Greek mathematics is also wide and advanced. Mathematicians like Pythagoras, Euclid, Plato, Archimedes, Ptolemy, Descartes, Gauss, Thales, Galileo, Pascal, Leibniz, Taylor, Euler, Lagrange, and Cauchy etc. have contributed a lot in the development of mathematics. Even today, the process of mathematical invention is going on. New experiments are being made in this field.

History tells us that development from the contributions of different civilizations and mathematicians, mathematics has remained as an important part of modern education and it has proved very useful in the day-to-day activities of the people. It has become very intimate with human life, industry, study, money, construction of building, economy of the country, marketing, evaluation of persons etc. Mathematics has come to the present state with rapid change. Today's world cannot run without mathematics, for everybody needs a form of mathematics for daily life and professional life. Realizing the need and importance of mathematics for education of the young generation, teaching mathematics is done in every school in the sense that everybody has to do something with mathematics in their daily life. For instance, we use mathematical process from the time we get up in the morning until right before we go to sleep. Everybody feels life would be quite difficult if they have no knowledge of mathematics. On a basic level we need to count our money, multiply, subtract and divide. We need knowledge of mathematics if we want to do something at home.

However, mathematics has great importance in the every field and everyday life. It is a fundamental element in the development of science and technology. The knowledge of basic mathematics is indispensable to our daily life. Counting objects, reading and writing numerals, performing arithmetic calculations as well as reasoning with numerals are tasks most people perform in their daily lives. Now a day's mathematics has been one of the most important studies. So, every country includes mathematics in their school education. In search of mathematics education

of Nepal, some forms were started from the ancient time at Vaidik age. Its history was developed by the Gurukul system. But at that time the study of mathematics education was not as a separate subject whereas the modern education system in Nepal seems to follow the world educational system. In October 1853, the educating Rana families established Durbar High School and opened the door of today's formal education in Nepal. Only the Rana families and upper classes were getting chance to learn. But changes of time, educational system also changed slowly and it was reached to the door of the people. Later Darbar High School had been opened to all public and other schools in different part of the country had also been opened. At snails' motion, the curriculum of mathematics education only arithmetic and algebra was taught. In 1990 B.S., the SLC Board was established, after that High School (Secondary School)Level, the curriculum consisted of altogether 700 full marks among which 100 marks for compulsory mathematics education and extra 100 marks added as optional mathematics education.

At the time of establishment of Durbar High School, the curriculum of mathematics education and textbooks were not well developed and at that time mathematics teachers were recruited /brought from India. Later, people became interested in mathematics education and their number also increased and the mathematics teachers were also available in Nepal. In this ways, the education system as well as mathematics education system was forwarded and the New Education System Plan (NESP, 1971) was formulated in Nepal, hence new curriculum was introduced. After that, people felt a great challenge in educational system. This system is known as the milestone in the history of curriculum development in Nepal.

A curriculum once made is not suitable forever. Therefore, it should be modified from time to time. Significant changes have been taken place in Nepalese life with the restoration of democracy in 2046 B.S. The government felt it necessary to modify the curriculum according to new situation. The new school curriculum of Nepal has been revised and implemented since 2054/2055 B.S. Consisting of altogether 800 full marks including 100 marks of compulsory and extra 100 marks added as optional mathematics. Recent curriculum has been brought in this form through broad discussion with maximum participation of subject specialists, psychologists, educationist, users, parents and teachers. Different national seminars on the issues of curriculum development have been organized. So, recent

curriculum of mathematics has emphasized on the student oriented activities rather than comprehensive and descriptive method. But the return has not been as desired by the curriculum. As the school situation and teaching activities are not in accordance with the practical aspects, we should give our extra attention to applied mathematics.

Mathematics education is the most debating issue and very sensitive part of culture in even modern society. Throughout the world, the culture in every modern society is associated with the planning of education policy and program. There is no systematic framework for the development of mathematics program in school education of Nepal. In Nepal, why mathematics? What mathematics? How mathematics? Is learned in school education are the critical question not yet answered satisfactorily.

Hence school mathematics for 21st century should focus on solving daily life problem of the society and the learners. Mathematics should be without comments. Today, there is no logic to motivate them to do mathematical problems and they fully depend on the teacher. Why is so mathematics dry? Why is mathematics so scary? Why is mathematics so difficult? etc. are the generally raised issues in mathematics teaching. There is no single answer for all such questions that is simply because classroom mathematics is not able to deal with practical and real life problems of students. For many students mathematics is an abstract and dry subject. It is necessary to make the teaching and learning of mathematics understandable, meaningful through the use of concrete and semi-concrete materials as far as possible. Unfortunately, in our schools very few good and qualified teachers are teaching mathematics. These few qualified mathematics teachers are limited within the valleys or in urban areas. Thus achievement in mathematics is lowers than other subjects at all school level and even in the SLC examinations. Most of the students fail in mathematics and they think mathematics is a difficult subject and the teachers also think the same in teaching mathematics. Therefore, the achievement of mathematics is very low and most of the students failed in mathematics. In many countries, the secondary school education has become compulsory for large number of children up to the age 15-16 years. Within these education system, mathematics holds an important position as a compulsory subject for all pupils up to the end of their school life or at least as an optional subject during their final years of schooling. In Nepal, mathematics has been

taught as one of the major subjects in secondary education. Mathematics constitutes the part of the curriculum goal of all in every country and it occupies a crucial position. In Nepal too, mathematics is taught as a compulsory subject which is the core that everyone should learn mathematics subject in school education. It has three components; arithmetic, algebra and geometry. These three components of mathematics are taught separately, where as geometry is one of the most important subjects of the school education.

Geometry is a growing body of knowledge with ever widening application and inherent beauty in its systematic structure and organization. According to Kelly and Ladd, 'Geometry is the science that treats on the shape and size of things, science of properties, the relations of lines, angles and solids.' Geometric concepts were developed from the beginning of the civilizations. Geometry of the early Babylonian and Egyptian was used in the measurement of areas and volumes. But there was no theoretical proof and reasoning that area and volume of geometrical shape was taken as geometry.

Geometry considered as tool for understanding, describing and interacting with the space is perhaps the most intuitive, concrete as well as reality based mathematics, on the other hand, geometry as a discipline, rest on extensive formulation process, which has been carried out for over 2000 years in increasing levels of rigor, abstraction and generality. Geometry should be taught in school because:

-It is key to mathematical thinking.

-It develops the ability to draw accurate plans.

-It enables the student to acquire a mass of geometrical facts.

Mathematics is one of the important subjects. Many people are involved in studying it. In fact, mathematics is a complex subjects. To study and achieve it, most labor and effort is needed. Not only this, much mental effort is also required to understand mathematics. The attraction of students towards the study of mathematics is declining day by day. From early childhood the talented students learned away from mathematics due to wrong priorities given by society at large. That's why only few get success in this subject though many people are involved in its study. Especially males are ahead than female in the study of mathematics.

Once it was an issue that female cannot get success in mathematical studies. Research and survey was done to find out whether it was true or not. Canadian citizen, Gila Hanna presented a report including the boys and girls of countries in achievement of mathematics. She used the data of the Second International Mathematics Study (SIMS) in her report. According to her report, the students of class 8 of age of 13 to 13.11 including boys and girls in achievement of mathematics; the following result has been shown: In learning achievement of arithmetic boys and girls are equal. In learning achievement of geometry boys are successful in 75% items and girls were in25% items only. In statistics girls were forward than boys but in measurement boys were forward. So in conclusion, it was found that girls are backward and weak in learning geometry than boys. Boys are successful in learning achievement in comparison with girls. So there is gender difference in learning and achievement of mathematics.

Thus, gender difference in learning mathematics continued to attract research in recent years. The effect of gender difference is visible in literacy rates of our society. Consequently, the question of gender equity in mathematics education is a complex issue. Although boys and girls take the assumed courses and read the same text book of mathematics in schools there is significance difference in the achievement pattern. The pattern of achievement is one of the significance aspects of educational researches. Most of the studies that have done so far are the comparative study of the achievement in different aspect of school mathematics. So the researchers undertook ‘The girls’ achievement in geometry and the factors affecting in achievement of geometry at grade IX’ as a problem under the study.

1.2 Statement of the problems

Mathematics has started at the infancy level from the beginning of human civilization to the advanced level at the twenty-first century. Today, other disciplines such as science, medicine and technology may be handicapped without mathematics and the world cannot run smoothly without it. It has become a gatekeeper in the life of their carrier choice in further study. Therefore, mathematics is the central part of the school curriculum not only in Nepal but also in the entire world. Most of the students in schools are poor in mathematics. So that low achievement in mathematics is common problem at school levels, developed underdeveloped countries as well. More than half of the total students

failed in mathematics in previous years as results of schools. Furthermore, that result shows that girls' achievement is less than boys. Low achievement in school geometry is one of the factors that make it form this result. But nobody studies about the affecting factors about the student's achievement. Thus, the study was mainly concerned with the achievement of girl students at grade IX in geometry and focused on the factors that affect achievement in geometry. For this, the study addressed to answer the following research questions.

- What is the achievement level of girls in geometry?
- Does the achievement of girls differ from the achievement of boys in geometry?
- What are the factors that affect achievement in geometry of girls' students?

1.3 Significance of the Study

Geometry is a branch of mathematics without which the development of other areas of mathematics is incomplete. Geometry is a meeting point between mathematics theory and mathematics as a model. Now a day nothing is out of capacity of geometry from sky craft to water vehicle. All concepts and principles of geometry are more useful for human beings. So, everybody needs the knowledge of geometry. But, geometry is one of the factors that make student achievement poor in mathematics because the achievement of student in geometry is very low. In that achievement, girls' achievement is less than that of the boys. So that the major responsibility of the people involved in mathematics education is to standardize the school mathematics program and improve the achievement level of the students.

In this context, this study is signified to provide important information about the factors that affects the girls achievement in geometry and help to draw teachers and parents attention to the factors to be considered on girls achievement in geometry. It provided hints to the administrators and math teachers to improve the achievement level and competency level of girls' students in mathematics. This research would be useful for the students who are interested to do some type of study work in other subject. The findings of this study would be helpful to pay attention to promote girls' achievement level. It will be open the door for future

promising researches to seek problem for future study. Thus, this research will add a new dimension to the field of research on achievement in mathematics.

1.4 Objectives of the Study

The main purpose of this study was to find out the girls' achievement on geometry and the factor that affects their achievement on geometry at grade IX. In addition with this, the study intended to accomplish the following specific objectives.

- To find the girls' achievement level in geometry.
- To compare the achievement of girls and boys students in geometry.
- To identify the factors that affects the achievement of girls in geometry.

1.5 Statement of Hypothesis

On the basis of the above objectives the following statistical hypothesis was formulated for this study.

Null hypothesis: There is no significance difference between the achievement of girls and boys in geometry. i.e. $H_0: \mu_1=\mu_2$

Alternative hypothesis: There is significance difference between the achievement of girls and boys in geometry. i. e. $H_1: \mu_1 \neq \mu_2$

Where μ_1 and μ_2 are the parametric means of score obtained achievement test by girls and boys students.

1.6 Delimitation of the Study

This was a survey study related to the achievement in geometry which was conducted only in Syangja district. This study was included only grade IX students of six public schools. It is limited to six mathematics teachers and 50 girl students from sampled school for collecting their opinions.

1.7 Definition of Related Terms

Some terms which are especially related to this research are defined as follows in order to omit the vagueness of the terms. However, their literal meaning may varies according to context.

Achievement

The term achievement is defined as the mark obtained by the students in an achievement test paper prepared by the researcher in geometry based on the grade nine syllabus of mathematics curriculum of Nepal.

Government School

The schools which are fully financed by the government are called government school.

CHAPTER II

REVIEW OF RELATED LITERATURE

This chapter deals with the review of the related literature and a framework for the study. The review of related literature is an essential aspect of a research project and this work is basically undertaken for the purpose of documenting the research findings drawn by the different researchers related to present study. It deals with some literature, which are reviewed from different books and reports related to this study are mentioned below.

2.1 Empirical Literature

Budhathoki (2059B.S.) has depicted a Canadian citizen Gila Hanna, she had presented in her report about “An achievement of mathematics of boys and girls” in twenty countries. According to her report, different countries girls student of grade eight are seem weaker than boys student in an achievement of mathematics. But she found that the concept of comparative study of boys and girls of different countries do not effect by the gender difference in the higher and lower achievement in mathematics but the students in the level of grade 12 are seem some more weak.

Jain and Arora (1995) did their research entitled “Effect of school level variables and achievement gap between boys and girls” and found that girls score is lower than boys in mathematics.

Joshi (1997) did a study related to determinants of achievement in mathematics entitled “Determinants of mathematics achievement of grade X students” in 431 male students and 423 female students and he analyzed mean difference between boys and girls in the mathematics achievement scores. The achievement score of boys was higher than that of girls in all tests and sub tests in arithmetic, algebra and geometry. When variability of scores was compared, girls were found to be more variable than boys on all the sub tests although difference was significant in the total tests and sub tests.

Neupane (2001) study of mathematics achievement pursued on the basis of ethnicity shows that boys are better than girls in the area of mathematics. His study entitled “mathematics achievement of primary school children of various ethnic

group of Nepal" made a survey of 250 boys and 250 girls from different selected ethnic groups. The sample students belonging to varied ethnicity differed from each other with respect to mathematics achievement.

Subedi (2005) did research work entitled "factors affecting failures in mathematics in SLC examination" with the objective to measure the effect of school and out of school contextual factors in mathematics achievement in SLC examination and to determine the correlation between affecting factors and mathematics achievement, locating in Sarlahi district. He concluded that the school environment such as school location, number of students in the classroom, classroom environment and regularity of teacher had strongly positive effects on mathematics achievement. The school environment is very essential for increasing the mathematics achievement. Effecting classroom teaching such as pleasing environment, initiation of lesson, use of instructional materials, and appropriateness to teaching participation to discussion, teachers' activities had strongly positive effects on students' mathematics achievement. Time variable i.e. amount of time students spent out on school activities such as leisure reading, homework, discussion with peer had strongly positive effects on mathematics achievement.

Ghimire (1997) did research entitled "A study on factors affecting teaching learning mathematics at secondary level" with the aim to study the factors affecting in learning of mathematics in secondary level by sex wise and rural urban location of schools in terms of the following school environment, family background, motivational factors, physical facilities, interest of the learners and instructional materials. He concluded that the environments of school in both rural and urban areas effects equally but boys were affected more than girls. Home environment affects more to the students of rural areas and girls were affected more than boys. The students of rural areas were more affected by use of instructional materials and girls paid more affection to the use of instructional materials.

From the above discussion of the related literature, a lot of studies have been carried around the world in gender differences in overall mathematics achievement in secondary level. Several investigation and reviews regarding sex differences in mathematics achievement have been conducted in various places of these countries like America, Africa, Canada, England, Australia and Germany and so on. But in

the context in Nepal, different research in mathematics education shows that achievement level of boys' students is higher than girls' students. Why girl's achievement is lower than boys in school geometry? What factors that affect the girls' achievement in geometry, so that the researcher undertakes this study?

2.2 Theoretical Framework of the Study

As discussed above related literature, achievement on geometry may depend under different variables. Generally achievement in geometry especially in girls influence from teaching learning process, home environment, school environment, social variables, errors in problem solving, time variables and attitude toward geometry. Under teaching learning process teachers' qualifications, interest of learners, expectations teachers, views and beliefs of teacher about girls' achievement were discussed. The variable home environment consists gender bias in home, parents education, practice time providing at home for children especially daughters, economic condition of parents, study hour of children at home. The third and most important factor that plays vital role in achievement in mathematics especially in geometry is school environment. Within these physical facilitates, students' number in classroom, gender bias, teachers and peers behaviors are considerable elements for doing better or worse in geometry. Social variable is also non separable and important factor in achievement in geometry. This includes social system, cultural customs, and traditional effects of gender in society. Among with error in problem solving and time variable are also played significant role in girls achievement in geometry. The above described variables together with constitute the girls achievement in geometry. The researcher has developed the following framework with the help of those variables.


Teaching Learning Process
Teacher's qualification
Interest of learners
Expectations
Views & beliefs
Social Variables
Social system
Cultural customs
Traditional effects of gender
Home Environment
Gender bias
Parents education
Practice time
Economic condition
Study hour
Factors Affecting the Girls' Achievement in geometry
School Environment
Physical facilities
No of Students
Gender bias
Teachers' and peers' behaviors
Time Variable
Drill
Review
Maintenance
Error in Problem Solving
Reading error
Comprehension error
Process skill error
Encoding error

CHAPTER III

RESEARCH METHODOLOGY

The chapter methodology presents the design of plan procedure of the study. It determines the size of sample, tools for data collection, data collection procedure and it also explains the statistical procedure used in analysis and interpretation of the result.

3.1 Design of the Study

This study was based on survey design. To explain the term survey design it was a form of planned collection of data for the purpose of analyzing the relationship between certain variables which were mainly related to the achievement in geometry especially the girls' students of government schools of syangja district. Thus, this present study is a more quantitative in nature including some description of the phenomenon.

3.2 Population of the Study

The population of the study consisted of all regular students in academic year 2067/068 B.S of secondary level government school at grade IX in Syangja district.

3.3 Sample of the Study

There are hundred and forty eight (hundred and fourteen public and thirty four private) secondary schools in syangja district. Among the entire one hundred fourteen public secondary schools, the researcher selected six schools for the sample of the study. The total 269 students are studying in academic year 2067/2068 B.S. The following schools were the sample of this study.

Table 3.3: School/Gender-wise presentation of sample

S.N	School's Name	Gender	Number of students	Total No. of students
1	Shree Jana Pradeep Higher Secondary School	Male	29	43
		Female	14	
2	Shree Pradhumna Paneru Higher Secondary school	Male	24	50
		Female	26	
3	Shree Tribhuvan Adarsha Higher Secondary School	Male	26	66
		Female	40	
4	Shree Kalika Higher Secondary School	Male	25	45
		Female	20	
5	Shree Jana Adarsha Higher Secondary School	Male	15	34
		Female	19	
6	Shree Mahendra Darshan Secondary School	Male	18	31
		Female	13	

For the interview six mathematics teachers were selected and fifty girls' students for the opinionnaire were selected from sampled schools.

3.4 Instrument for Data Collection

Every study needs tools to collect data. Likewise for this study one set of achievement test paper, one set of opinionnaire and one set of interview schedule were the main instruments. The construction process and validation of the tools in this study are described below.

3.4.1 Development of Instruments

a. Achievement Test

An achievement test was main research tool for this study. Achievement test measures as the crucial factor to explore the students' achievement. The researcher had framed test item for the achievement test with the help of curriculum, specification grid, text book and consulting with the supervisor. The items were kept in the form of multiple choices. Before preparing the standardized test, the pilot test is necessary. So the pilot study was used at Barahi Higher Secondary School, Malepatan, Kaski district.

b. Opinionnaire Scale

An information that attempts to measure the attitude or belief of an individual is known as an opinionnaire or attitude scale. So, one set of opinionnaire was developed as an instrument for the collection of needed information which was used for girl students. Prior to construct those tools for the study, the following factors that affect the achievement on geometry were identified from the review of literature with the help of experts and advisors. Teaching learning process, home environment, school environment, time variable, attitude towards geometry, error in problem solving and social variables were the factors that were included in this study. It is assumed that these variables as already established could the girls' achievement in geometry in Secondary Education of Nepal.

One set of opinionnaire scale were developed having thirty nine statements related to the above variable (see Appendix – B) for the girls students who are studying at grade IX in Syangja district. These scales were developed in Linkert Scale Point Techniques. Both positive and negative statements were included in the scale. Scoring of the statements was done as shown in the following table.

Table 3.4 Linkert- Scale Point Used in Technique of Scoring

S.N	Meaning of rating	Marks	Negative Statement	Positive Statement
1	Strongly Agree	5	1	5
2	Agree	4	2	4
3	Undecided	3	3	3
4	Disagree	2	4	2
5	Strongly Disagree	1	5	1

This study has used opinionnaire for measuring girl students' attitude towards the factors that affect on their achievement in geometry with the help of the variable given in theoretical framework of this study.

c. Interview

Interview is a process of communication or interaction in which subject or interviewee gives the needed information verbally in a face to face situation (Koul, 1997). Interviewee is encouraged to respond towards the question after building a better rapport. There are many types of interview; especially direct interview was conducted with clients in this study. In this technique, the researcher not only asked the questions but also observed all behavior and answering method of respondents.

3.4.2 Reliability and Validity of Instrument

Reliability and validity of the research instrument are the necessary qualities of instrument. For the purpose of reliability of achievement test pilot test was used at Barahi Higher Secondary School at Malepatan in Kaski district. The average time taken by the students to complete the items was 1 hour. The numbers of students tested in the school were 50. On the basis of item analysis (see Appendix-D) the researcher determined the level of difficulty (p-value) and discrimination index (D-value) of each item of the test were calculated from the tabulated 27 percent of highest scores and 27 percent of lower scores of 45 items. 5 numbers of items were

cancelling and 7 were modified. After that refined items prepared. The content and face validity of the test were established through the experts judgment. The reliability coefficient of the test was found out by using split half method.

The opinionnaire which are used in my thesis that were already found out the reliability and validity by Ramji Prasad Devkota in his Masters' thesis "Factor Affecting the girls Achievement in Geometry" in Kaski district. So, the suggestion of thesis supervisor, it may not be essential to test the reliability and validity of those statements again.

3.5 Data Collection Procedures

After selecting the sampled schools purposively, the researcher visited the related school with instrument to collect data. Before administration of the tools, investigators met the authorities and explain the purpose of the study in detail. Once the principal of the school agreed to allow the study to be carried out, the researcher arranged the date and time for administrating the instrument when the students and teachers were assembled ready to participate in the study, the researcher explained its purpose and relevance and research tools were administrated in group with direct supervision. The data was achieved by administrating the achievement test paper among the sampled student. Finally, the researcher scores for the analysis. For the opinion of girl students, the researcher distributed opinionnaire for sampled students and translated each statement one by one in course of administering the opinionnaire (see in appendix-B). After getting response of all the students, the opinionnaire was taken back with thanks.

With the help of semi- structured interview schedule, the interview was conducted with mathematics teachers of each sample school. The response given by the teachers was arranged in different code.

3.6 Data Analysis Procedures

The researcher analyzed the obtained data by using the following statistical techniques.

T-test: The statistical device t-test was used to compare the significance of means. So, it was applied in this study. The mean, standard deviation, variance and

two tailed t-test were used at level of significance α=0.05 for the analysis of achievement score.

The computation formula used for the calculation of t-test was:

$$t = \frac{\overline{X1} - \overline{X2}}{Sp\sqrt{\frac{1}{N1} + \frac{1}{N2}}}$$

Where,

$\overline{X_1}$ =Mean of the first sample

$\overline{X_2}$ = Mean of the second sample

N_1= Number of students in first sample

N_2= Number of students in second sample

S_p= Pooled variance

$$S_p^2 = \frac{(N_1 - 1)\, S_1^2 + (N_2 - 1)\, S_2^2}{N_1 + N_2 - 2}$$

i.e.

Where,

S_1^2 = Variance of first sample

S_2^2 = Variance of second sample

Chi- Square (χ^2) test: The χ^2- test, measured the relationship between the variables. It also measured the dependency between variable. So, it was applied in this study.

The statistical device χ^2 – test was applied to all statement of opinionnaire scale at α = 0.05 level of significance. This indicated that if the χ^2 – value for every statement more than obtained value (tabulated value) $\chi^2_{0.05,\ 4}$ =9.488, and then the student has positive attitude towards these statements otherwise negative attitude towards these statement.

The computation formula used for the calculation of χ^2- test was

$$\chi^2 = \frac{(f_o - f_e)^2}{f_e}$$

Where, f_o = Observed frequency

F_e = Expected frequency

The calculation of f_e was

$$f_e = \frac{i^{th} \text{ row total} \times j^{th} \text{ column total}}{\text{Grand total}}$$

In this research which has already mentioned that there was one set of opinionnaire with five scales- strongly agree, agree, undecided, disagree and strongly disagree with rating scale value 5, 4, 3, 2, 1. Total scores in each statement were calculated and found χ^2- value to find the different expected result.

-Descriptive analysis was done for qualitative data obtained from the interview.

CHAPTER IV

ANALYSIS AND INTERPRETATION OF RESULT

The data analysis and interpretation is the process of systematic searching and arranging the information from the achievement test, opinionnaire scale, interviews and other tools (Begdom and Biklen 1998: cited: Best & Kahn, 1999). This chapter deals with the analysis interpretation of the collected information to find the girls achievement in geometry and find out the factors that affect the achievement of girls in geometry at grade IX. It has already been mentioned that there were one set of achievement test, one set of opinionnaire scale with five scales- strongly agree, agree, undecided, disagree, strongly disagree with rating values 5, 4, 3, 2 and 1 respectively in each statement and one set of interview schedule. The collected data were tabulated and analyzed for attainment of objectives and verification of the hypothesis.

First, this chapter deals with the statistical analysis and interpretation of data obtained from achievement test by calculating mean, standard deviation, variance and t-test with two tailed at 0.05 level of significance. After that, the base analysis of the collected information obtained from opinionnaire and interview schedule is based on the theoretical framework prepared from the review of literature. Theoretically, it is assumed that variables such as teaching learning process, home environment, school environment, time variable, attitude towards geometry, error in problem solving and social variables could be the main contributors for the information of achievement of girls in geometry. The data were obtained from the girls' students who were studying at grade IX in secondary level. The collected information analyzed and interpreted is discussed on the following sections separately.

4.1 Comparison of Girls and Boys Students Achievement Scores in Geometry

First part of analysis is related to the quantitative approach which gives the statistical information of the quantitative data and interpretation of the result. The data of the achievement test scores are analyzed and interpretation is presented to compare the mean achievement scores between boys and girls students at grade IX in geometry of secondary school mathematics.

The data of achievement test scores are obtained from the following schools: Shree Jana pradeep Higher secondary School, Shree Pradhumna Paneru Higher Secondary school, Shree Tribhuvan Adharsha Higher Secondary School, Shree Kalika Higher Secondary School, Shree Jana Adharsha Higher Secondary School and Shree Mahendra Darshan Secondary School. The following table (table-4.1) provides the general information about the terms of total number of students, mean, standard deviation, variance and t- value of them.

Table No.4.1

Comparison the achievement scores on Geometry achieved by girls and boys students

Students	Numbers Of Students	Mean $\bar{X}$ (X)	Standard Deviation S.D.(σ)	Variance (σ^2)	T-Value	Remarks
Boys	137	21.27	4.12	16.98	7.85	The null hypothesis is rejected
Girls	132	20.26	3.9	15.25		

The above table shows that comparison of the achievement score in geometry between girls and boys student of government school. The above table represents that the total number of boy students is 137. The mean score obtained by them is 21.27 and their standard deviation and variance are 4.12 and 16.98 respectively. Similarly, the total numbers of girls were 132. The mean score obtained by them is 20.26 and their standard deviation and variance are 3.9 and 15.25 respectively. The calculated t- value is 7.85 and tabulated value $t_{0.025,\ 267}$ =1.96. The calculated t-value 7.85 is greater than the tabulated value 1.96. Hence, the null hypothesis H_0 : $\mu_1 = \mu_2$ is rejected and the alternative hypothesis H_1 : $\mu_1 \neq \mu_2$ is accepted. It concludes that the mean achievement of girl and boy students is significantly different in achievement on geometry at grade IX. Thus researcher found that the girls mean achievement in geometry is less than boy's students.

4.2 Factors Affecting Girls Achievement on Geometry

The information obtained from the opinionnaire and semi- structured interview schedule is analyzed and interpreted in this part. There are several factors affecting the girls' achievement in geometry. With the help of related literature and theory, it was assumed that the different six variables affected the girls' achievement in geometry. Such variables are described separately as follows.

4.2.1 Influence of Teaching Learning Process in Girls Achievement on Geometry

Theoretically, it was assumed that girls' achievement in geometry is influence by the teaching learning process. Teachers' qualification, interest of learners, expectation, views and beliefs toward geometry are explained under the teaching learning process. Teachers' qualification as determined by education, experience and licensure has been shown to be the single most significant factor contributing to student achievement. Interest of learners is also an important determining factor in students' achievement. If students do not have curiosity to learn, the teacher cannot teach. The expectations of teacher, parents and students themselves have a significant effect on achievement levels. Different research shows that the students who are expected to learn are more likely to achieve in school. It has been shown that teachers generally tend to have lower expectations for minority children and children from poor families. Students' attitudes and beliefs also effect the achievement in mathematics. Many articles suggest that girls have negative attitudes and expectations for their performance in mathematics. Teachers' teaching style such as their use of cooperative rather than comprehensive learning also plays a vital role in girls' relationship with mathematics. The following six statements define the teaching learning process that can influence girls' achievement in school geometry.

Table – 4.2.1

S.N	Statements	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree	χ^2-value	Decision
1	I am not curious and active while teaching geometry.	6	13	20	7	4	47	S
	Observed Frequency(F_o)	30	52	60	14	4		
	Expected Frequency(F_e)	50	40	30	20	10		
2	I enjoy when solving Geometrical problems.	5	10	9	20	6	34.4	S
	Observed Frequency (F_o)	25	40	27	40	6		
	Expected Frequency (F_e)	50	40	30	20	10		
3	The class of geometry is less interesting than other topics of mathematics.	7	17	15	8	3	37.3	S
	Observed Frequency(F_o)	35	68	45	16	3		
	Expected Frequency(F_e)	50	40	30	20	10		
4	Our teachers try to make the geometry lesson interesting.	4	5	7	14	20	43.9	S
	Observed Frequency(F_o)	20	20	21	28	20		
	Expected Frequency(F_e)	50	40	30	20	10		
5	Geometry is an essential part of the study of Math.	6	12	18	6	8	32.4	S
	Observed Frequency(F_o)	30	48	54	12	8		
	Expected Frequency(F_e)	50	40	30	20	10		
6	All mathematics teachers are trained on motivating students with different ability.	3	5	10	15	17	44.4	S
	Observed Frequency(F_o)	15	20	30	30	17		
	Expected Frequency(F_e)	50	40	30	20	10		
7	Teacher always use teaching materials while teaching geometry.	12	3	4	18	13	46.1	S
	Observed Frequency(F_o)	60	12	12	36	13		
	Expected Frequency(F_e)	50	40	30	20	10		

'S' stands for significant and 'NS' stands for insignificant. The value of χ^2 – test at 0.05 level of significant at 4 degree of freedom is 9.488 ie $\chi^2_{0.05(r-1)(c-1)} = \chi^2_{0.05,4} = 9.488$.

The statements were tested using χ^2- test at 0.05 level of significance. All the statements are significance at this level. So, it can be said that the entire students accept these statement. The statement first, second and third are related with the interest of students. The response of almost students shows they do not have more interest in geometry. Most of the students gave their views on undecided opinions that mean they do not have the knowledge about the important of geometry for learning school maths. From all these statements it is concluded that the teachers qualification, interest of learner, expectation etc. are the influencing factors in achievement of girls students on geometry.

In addition to quantitative information the interview was taken from the mathematics teacher to derive qualitative information regarding the influence of teaching learning process in geometry achievement of girl student. According to the information achieved from the mathematics teacher, the main influencing factor on achievement in geometry were the interest of learners, teachers' qualification and method of teaching due to lack of teaching materials, limited time period, the teacher cannot use sufficient teaching materials or teaching aids. Most of the teachers use traditional lecture method. On the other hand, girl participation in teaching learning process is very low. They cannot ask questions direct to the teacher because of their society schooling. Hence, from the result analyzed in quantitative techniques and responses of math teacher in interview it is concluded that the teaching learning process are main influencing factors in girls' achievement in geometry.

4.2.2 Influence of Home Environment in Girls Achievement on Geometry

Home is considered as a foundation of education. Theoretically, it is assumed that the achievement in geometry is highly influenced by the home environment. Parents' education, socio-economic conditions of family, study hour at home, practice time of geometry and gender bias in family generally considered as the home environment. The achievement of child depends not only on the part of played by teachers but also on the parents' awareness, interest and knowledge about handling and guiding their children at home. The economic status of the parents directly affects the child learning. Various researches have shown that higher the socio-economic status of family have the greater children achievement. The roles, responsibilities, opportunities, practice time given by family to daughter

in home is also played the vital role in achievement on geometry. The following six statements given in the table 4.2.2 are related to the home environment support in course of learning and sorts of pressure created to girl students' achievement on school geometry.

Table – 4.2.2

S.N	Statements	Strongly agree	Agree	Undecided	Disagree	Strongly disagree	χ^2 value	Decision
1.	My parents do not manage all required materials for the study of mathematics.	18	19	7	4	2	80.7	S
2.	My parents treat unequally my brother and me.	7	23	4	12	4	87.3	S
3.	My patents do not discuss about my learning progress report with math teacher.	5	17	7	16	5	44.5	S
4.	My family manages tuition and coaching if necessary.	3	14	13	16	4	44.4	S
5	I have no more time to study at home.	6	21	3	12	8	72.3	S
6	Learning environment of mathematics is not better for me at home.	5	19	8	13	5	50.4	S

'S' stands for significant and 'NS' stands for insignificant. The value of χ^2 – test at 0.05 level of significant at 4 degree of freedom is 9.488 ie $\chi^2_{0.05(r-1)(c-1)} = \chi^2_{0.05,4} = 9.488$.

The table 4.2.2 shows that χ^2 – value of six statements are significant at 0.05 level of significance. It means that an almost girl student accepts these statement. The statement first and second shows that the parents do not treat and manage the learning materials equally to the son and daughter. Girls do not have more time to study at home. So from these responses it is concluded that the gender bias at home is also responsible to reducing the achievement of girls' students in geometry.

Beside the quantitative data, the researcher had conducted interview to the teacher to collect qualitative information about the influence of home environment in achievement in geometry of girl students. In course of interview period, the teachers' views were the time period given by students to learn geometry at home, parents views towards their daughter, extra class managed by parents in home are also the influencing factors in achievement in geometry of girls' students.

Hence from the above analysis, it can be concluded that parents education, parents behaviors, study time at home are the influencing factor in achievement on

geometry. Due to the less priority given by the parents to their daughter in learning mathematics is main cause of low achievement in geometry.

4.2.3 Influence of School Environment in Girls Achievement on Geometry

There are many factors that affect student achievement. This study explored one factor that historically has received little attention by educational leaders. Researchers showed that planners should give serious consideration in designing learning environments outside of the traditional classroom. Along with more attention should be given to the exterior design of school buildings. The classroom lighting, color choices and windows play a significant role in the achievement of students. The teaching materials managed by school, number of students in classroom, teachers' behavior toward girl students, peers behavior with their friends, collaboration, sharing of knowledge questions answer to the teacher and student and roles, responsibilities and opportunities given by school and teachers to the girls student are main determining factors for girls achievement in geometry . The following six statements define the positive influence of school environment in girl students' achievement on school geometry.

Table – 4.2.3

S.N	Statements	Strongly agree	Agree	Undecided	Disagree	Strongly disagree	χ^2 Value	Decision
1	School manages all the teaching materials for learning geometry.	7	14	6	13	10	17.5	S
2	Teachers teach focusing the boys more than girls.	15	19	3	10	3	64.5	S
3	Teachers are always suggestive to motivate girl's student to study geometry.	3	5	10	15	17	44.4	S
4	I like to solve mathematical problem with my friends.	4	15	4	17	10	48.6	S
5	It is difficult to ask the problem which has not been understood.	12	19	2	13	4	59	S
6	The math teacher teaches regular in the class.	22	24	0	4	0	197.6	S

'S' stands for significant and 'NS' stands for insignificant. The value of χ^2 – test at 0.05 level of significant at 4 degree of freedom is 9.488 ie $\chi^2_{0.05(r-1)(c-1)} = \chi^2_{0.05,4} = 9.488$.

The table 4.2.3 shows that χ^{2-} values of five statements out of six statements are significant of 0.05 level of significance. The χ^{2-} value of the statement "the math teacher teaches regularly in class" is highly significant, that means the teachers are punctual in class. But in the second and fifth statement shows that in classroom teacher always focus on boys and talent students teaching geometry. Most of the students disagree the statement that "school manages all the teaching materials for learning geometry." From these all statement it can be concluded that school environment which is existed in our context is also an influencing factors in achievement of geometry.

Interviews were taken with the mathematics teacher to get the qualitative information concerning the role of school environment in achievement in geometry of girl students. Most of the teachers' views were the low school facilities, large class size, limited teaching materials and culturally biased view about girls students are the main cause of low achievement in geometry.

Hence from the above discussion it can be concluded that the school environment which is not better to acquire high result is also the cause of low achievement in geometry.

4.2.4 Influence of Time Variable in Girls Achievement on Geometry

After gaining the mathematical concept or knowledge, the most important thing is to make it long lasting. To make it permanent drill, review and maintenance are the main factors. Appropriate drills not only develop the knowledge and skills in students but also it develops the habit of practice. Similarly review of mathematical concept is one of the most important factors in learning process. The main purpose of review is to organize and retain learning. It provides new motion to the student. At last the most important factor to permanent of the learning is maintenance. It prevents the student to forget the mathematical concept, skills and relations. The following five statements given in table 4.2.4 are related to time variable that could create positive environment for girls' student in the achievement of geometry.

Table – 4.2.4

S.N	Statements	Strongly agree	Agree	Undecided	Disagree	Strongly disagree	χ^2 value	Decision
1	I study geometry whenever I am free.	3	5	11	19	12	38.4	S
2	I always complete math homework given by math teacher.	4	13	2	18	13	54.4	S
3	Teacher gives class work as well as homework and checks it.	8	17	1	16	8	53	S
4	I keep on practice of already taught geometric problems.	2	9	6	19	15	55.9	S
5	Course of mathematics is not complete in time.	11	20	4	12	3	57	S

'S' stands for significant and 'NS' stands for insignificant. The value of χ^2 – test at 0.05 level of significant at 4 degree of freedom is 9.488 ie $\chi^2_{0.05(r-1)(c-1)} = \chi^2_{0.05,4} = 9.488$.

The table 4.2.4 shows the χ^{2-} value at 0.05 level of significance is significant. However, most of the students disagree with these statements except the statement "course of mathematics is not completed in time." From these it can be concluded that most of the girl students do not give more time in studying, reviewing the geometrical problem. Due to this reason the achievement of geometry of girl students became low. At last it is concluded that time variable is also an influencing factors that affects an achievement of girls' students in geometry.

In addition to surveying the factor that affects the girls' achievement in geometry, the researcher had taken interview with teacher for qualitative information. The teachers' views regarding this time variable were also similar with the result obtained from the quantitative techniques. Most of the teacher focus on the drill, practice, and maintenance or reviewed of studied lesson done by students is the main factors for achieving good or bad result in geometry. They also added that especially the girl students do not give more time to study mathematics as well geometry also, which is the main cause of low achievement in geometry.

Hence, from above both types of analysis it can be concluded that the minimum time given by girls students in learning geometry is also the cause of low achievement in geometry.

4.2.5 Influence of Error of Problem Solving in Girls Achievement on Geometry

According to theory reviewed above, it is assumed that error in problem solving is also an influencing factor in achievement in Geometry. Reading error, comprehension errors, transformation error, process skill error, encoding error is considered as the errors problem solving. An error was classified as reading errors if a student could not read a key word or symbol. The comprehension error is an error in which the student cannot grasp the overall meaning of geometric problem is known as translation errors. If the students have no idea to identify the operation or sequence of operation needed to solve the problem. An error was classified as process skill error when a student was able to identify the correct operation but did not know the procedure to carry out these operations accurately. Encoding error was an error in which students are unable to express the solution in an acceptable written form. The following six statements define students' positive attitude towards different error in solving problem in geometry.

Table – 4.2.5

S.N	Statements	Strongly agree	Agree	Undecided	Disagree	Strongly disagree	χ^2 value	Decision
1	I feel difficulty in reading geometry key words or symbols.	8	19	5	15	3	51.8	S
2	I feel hard to comprehend the overall meaning of geometrical problem.	12	18	7	3	10	40.1	S
3	I myself have no trick to solve any problem of geometry.	15	7	12	15	1	30.4	S
4	I need the help of teachers to solve any problem of geometry.	14	19	7	6	4	48.6	S
5	I cannot find myself the wrong of any geometric questions.	13	20	9	3	5	58.1	S
6	I always make mistake in solving the geometrical problems.	13	18	8	7	4	36.7	S

'S' stands for significant and 'NS' stands for insignificant. The value of χ^2 – test at 0.05 level of significant at 4 degree of freedom is 9.488 ie $\chi^2_{0.05(r-1)\,(c-1)} = \chi^2_{0.05,\,4} = 9.488$.

The χ^2-value at 0.05 level of significance of all the above statements in the table-4.2.5 is significant. That means almost all students are agreed with these

statements. From these we can say that most of students feel difficult in reading, comprehending the overall meaning of geometry and make mistake in solving the geometrical problem. So, it is concluded that the error in problem solving is also a cause of low achievement in geometry.

Beside this qualitative analysis the researcher also took interview with the math teachers regarding the error in problem solving in geometrical problem. The teachers' views were generally the students can read and comprehend geometric problem but they are unable to use properly in problem solving. Teachers in interview added that improvement of language is necessary for the student to understand geometry depending upon the understanding of the other subjects too. Basic concept of other subject is equally important for learning mathematics.

From the above discussion, it can be concluded that error made by girl students in understanding geometry is also the cause of low achievement on geometry.

4.2.6 Influence of Social Variable in Girls Achievement in Geometry

Theoretically it was reviewed that culture and social factors are responsible for the under achievement of girls achievement in mathematics. The different social variable such as social system, cultural customs and traditional effects of gender biases are the main factors that minimized the girls' achievement in geometry. Boys were educated / exposed to the society but girls were restricted in their kitchen and spent most of their time in helping their mothers in domestic work. This is the traditional effect of gender equity which influences the girls' mental development and achievement. The following seven statements define the social and cultural factor which affects in student achievement.

Table 4.2.6

S.N	Statements	Strongly agree	Agree	Undecided	Disagree	Strongly disagree	χ^2 value	Decision
1	Our society unequally treats boys and girls.	13	20	10	3	4	57.9	S
2	There are literate people in our society.	9	15	4	13	9	23.2	S
3	Female have inferior place in our society.	5	23	7	8	7	84.5	S
4	Low role and opportunity of girls in society.	13	19	11	5	2	48.6	S
5	Our society has no idea whether the subject matter of geometry is good or bad.	18	13	7	5	7	56.2	S
6	The society and persons admire the girls in learning geometry.	5	13	15	12	5	26.9	S
7	The society does not inspire to learn geometry.	7	16	22	4	1	77.4	S

'S' stands for significant and 'NS' stands for insignificant. The value of χ^2 – test at 0.05 level of significant at 4 degree of freedom is 9.488 ie $\chi^2_{0.05(r-1)(c-1)} = \chi^2_{0.05,4} = 9.488$.

The table 4.2.6 shows that five statements are significant and two statements are insignificant at 0.05 level of significance of χ^2 – test which implies that the society gives unequal role, responsibilities and opportunities to the girls and boys students. The statement second and six gives less significant result. Which gives the society has equally literate and illiterate people. But most of the people of society do no encourage and admire the girls to learn geometry. Thus, the social variable which includes social system, cultural customs and traditional effect of gender directly influence in the achievement in geometry of girl students.

Beside quantitative testing qualitative information were collected from mathematics teachers regarding the relation of social variables in girls' achievement. By the response of math teachers, it was concluded that there is still misconception that mathematics was what men did. This views and beliefs that mathematics and related fields are more appropriate for boys than for girls persist in many contemporary societies. On the other hand, a specific obstacle is the prevalent bad image of mathematics and mathematician in society and community. Some people hate geometry and mathematics because it caused their failures or the failure of their students at school. Political, economics, religious and cultural

condition of the society affects in the achievement of geometry for girls. The response of the interview of teacher and the result of opinionnaire scale remain same. So it is said that the girl students' achievement in geometry is influenced by social variable.

CHAPTER V

SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter is basically concerned in deriving some findings and conclusions from the discussion of the previous chapter. Besides finding and conclusion, it has some recommendations which will be useful for further studies and educational implications.

5.1 Summary of Findings

This study is based on the survey study. The study design has utilized both quantitative qualitative research approaches. The main purpose of the study was to find the girls achievement in geometry and to investigate the factors affecting achievement in geometry of girls' student. The population of the study consisted of all girls students at grade IX in the academic year 2067/068 of Syangja district. For the survey purpose, the researcher employed convenient sampling techniques to select the sample schools in the first stage. Among hundred and forty eight secondary schools of Syangja district, six public schools were selected as the sample schools. All girl students of grade IX was the sample students of the sampled school. Altogether 269 students where 137 were boys and 132 were girls students are taken for implementing the achievement test. The researcher used an achievement test, one set of opinionnaire scale and one set of semi- structured interview schedule for collecting information or data. Achievement test was administrated to both boys and girls students. The result obtained from achievement test was analyzed by using t-test. Opinionnaire scale was used only to girl students to investigate the factors that affects in achievement on geometry. The opinionnaire scale was developed on the basis of Likert five point techniques. The collected data from opinionnaire scale were analyzed by using χ^2- test in 0.05 level of significance. Interview was carried out to the math teachers of the selected sample school. The data obtained from interview were analyzed by descriptive method. Then, the researcher substantiating as triangulation to the quantitative analysis result from the quantitative information of achievement test and opinionnaire scale and qualitative analysis result from qualitative information from the interview. From the analysis of the huge number of data at the end of the researcher found the major findings of the study are categorized as follows.

- There is a low achievement level of girls' students in school geometry.
- There is a significant difference in the achievement in geometry at grade IX of girls and boys students.
- Teaching learning process in which teacher's qualification, interest of learners, student as well as parents' expectation and their views and beliefs directly influence on girl achievement.
- It is found that home environment such as gender bias at home, parents' education, practice time given to solve problem, economic condition of family and study hour of student at home influence the girls' achievement in geometry.
- The school environment such as physical facilities of school, the number of students, gender bias at school, teachers and peers behaviors towards girl students affect the girls' achievement in geometry.
- From the analysis, it is found that continuous the practice, review and application of geometrical concepts affects on the achievement of girl students in geometry.
- The girls who were encouraged by society to study mathematics did better in geometry, where as those who were discouraged did not do well in geometry. Thus, it can be concluded that the social variables such as social system, cultural customs and traditional effects of gender directly influence the achievement in geometry of girls' students.
- From analysis it is found that most of the students feel difficulty in reading, comprehend the overall meaning of geometry and make mistake in solving the geometrical problem. Due to this cause, they cannot do better in geometry.

5.2 Conclusion

Mathematics is a gateway to many areas of further study and a 'critical filter' in employment. It is a source of equality; it closes many educational and career opportunities to disadvantaged group and female children. It is showed that the

mathematics achievement of female in Nepal is at critical stage in overall school achievement. Similarly, the achievement in geometry of girls' students in school geometry is also very low. Society as a whole believed that female is mathematically less capable than male. This belief is communicated by parents and teachers to students. Girls come to view their failures in mathematics as evidence that they indeed feel inferior and view their success as flunks. This reinforced the belief that they are not capable of doing well in mathematics.

Although mathematics education has been given an important place in curriculum of all level of school and the university education as well geometry covers the one third part of school mathematics curriculum most of the students fail in this subject. This is unknown factors impeded students' progress in this subject. In this case of failure, the number of girl students is very high. It is felt that girls are unable to catch the mathematical ideas what boys do. However, this reason is not scientific because different researches have shown that girls are also equally capable to do maths with boys. But what is the causing factor that makes girls' failure in mathematics especially in geometry was the main concerned of this study.

In the conclusion of this study, mainly six factors were identified as influential variables for the achievement in geometry of girl's students. Those six variables were the:

- Home environment,
- School environment,
- Teaching learning process,
- Social variable,
- Error in problem solving,
- Time variables.

At last, it can be said that girls are equally talented and should be given equal facilities at home and school to learn geometry. Parents and teachers should not consider boys are assert and girls as a liability.

5.3 Recommendation for Further Study

The conclusion of this study cannot be generalized to all schools students (private and public) due to the limitations contained in this study. Thus, after analyzing the conclusions and implications of the study the researcher has made the following recommendations or suggestions for further study to validate the present study's findings.

- Almost of the girls students are weak in mathematics, especially in geometry. So to get optimum output, improvement is needed in all mathematics education programs for girl students. Research should be focused in this area.
- This study was done only in Syangja district as a case. For generalization of the result of the study, similar study should be done in a wider scope and large sample.

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Appendix - A

An Achievement Test

Class IX (2067/2011)

Name: Full Mark: 45

Roll No: Pass Mark: 16

School: Time: $1\frac{1}{2}$ hrs

Read the questions carefully and put a tick mark (√) which is the best answer. If you need rough in finding right response, use the paper sheet you are given.

Example: The length of rectangle is 12cm, and breath is 4cm. What is the area of the rectangle?

a. $16cm^2$ b. $38cm^2$
c. $60cm^2$ √d. $48cm^2$

Attempt all the questions.

1. In geometry a point is a geometrical figure which has

   a. Length but no breath b. no length and no breath

   c. Length d. breath but no length

2. Which of the following geometrical figure is curve line?

   a. A ⟷ B b. A ⟶ B

   c. A ~ B d. A ——— B

3. The inclination between two straight lines when they meet at a point is called

   a. Curve b. Line

   c. Point d. Angle

4. The angle which is greater than 90^0 but less than 180^0 is called

   a. Obtuse angle b. Acute angle

   c. Right angle d. Reflex angle

5. A pair of angles lying on the opposite side of a transversal when it cuts two line segments is called

a. Adjacent angle b. Alternative angle

c. Co-interior angle d. Corresponding angle

6. A single object is equal to the sum of its all parts and it is always greater than each part

a. Equal axiom b. Substitution axiom

c. Multiplication axiom d. Whole part axiom

7. Which one of the following is not a property of triangle?

a. The sum of the angle of any triangle is right angle.

b. The sum of any two sides of a triangle is greater than the third side.

c. All angles of an equilateral triangle are 60^0.

d. The base angles of an isosceles triangle are equal.

8. When two sides of a triangle are equal in length, the triangle is said to be

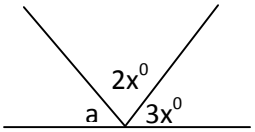
a. Equilateral triangle b. Isosceles triangle

c. Right-angle triangle d. Scalene triangle

9. Express 'a' in terms of 'x' from the following diagram

a. $180^0 - 2x^0$ b. $5x^0$

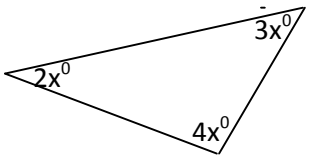
b. $180^0 - 3x^0$ d. $180^0 - 5x^0$



10. From the figure, the value of 'x' is

a. 20^0 b. 30^0

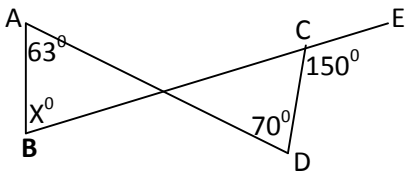
c. 50^0 d. 180^0



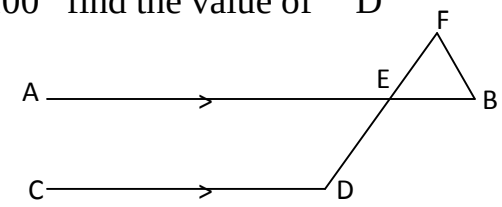
11. In the given figure, calculate the size of the missing angle

a. 150^0 b. 83^0

c. 37^0 d. 143^0



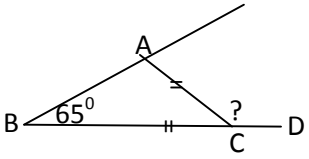
12. In the given figure, AB ‖ CD and B + F=$100^{0,}$ find the value of D



a. 110^0 b. 83^0

c. 70^0 d. 100^0

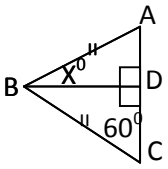
13. In the adjoining figure, if ABC = 65^0 and AC =BC. What will be the measure of ACD?



a. 65^0 b. 115^0

c. 120^0 d. 130^0

14. Find the angle x^0 in the basis of following figure.



a. 60^0 b. 30^0

c. 90^0 d. 150^0

15. Which of the following is not parallelogram?

a. Rectangle b. Rhombus

c. Square d.Trapezium

16. A quadrilateral having two opposite sides parallel is called

a. Trapezium b.parallelogram

c. Rhombus d. Square

17. Which of the following statement is not true?

a. Opposite sides of a rectangle are equal

b. All sides of a square are equal

c. All angle of a parallelogram are equal

d. Diagonals of a parallelogram bisect each other

18. Area of quadrilateral is

a. Length × breadth b. Base × height

c. $\frac{1}{2}$ × product of diagonals d. None of these

19. The distance between two sides of a trapezium is called its

a. Altitude b. Medians

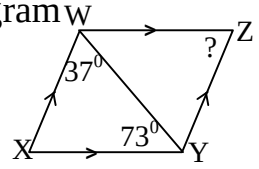
c. Legs d. Bases

20. The parallelogram having its adjacent sides equal but none of the angle as a right angle is known as

a. Rectangle b. Square

c. Parallelogram d. Rhombus

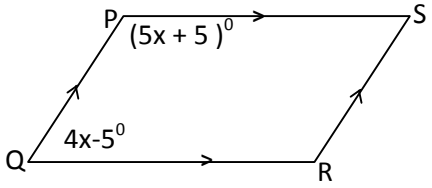
21. Calculate the WZY from the adjoining parallelogram



a. 110^0 b. 70^0

c. 40^0 d. 73^0

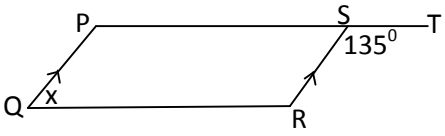
22. In the given parallelogram PQRS, QPS= $(5x+5)^0$ and PQR= $(4x- 5)^0$. Find the value of x^0



a. 30^0 b. 45^0

c. 45^0 d. 70^0

23. In the given parallelogram PQRS, TSR=135^0, find the value of x



a. 65^0 b. 45^0

c. 115^0 d. 135^0

24. Which of the following statement is not correct?

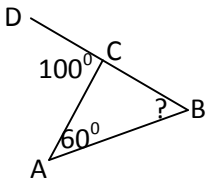
a. In any triangle, the side opposite the greater angle is longer than the side opposite to the smaller angle.

b. Of all segments that can be drawn to a given line from a given point out side of it, the perpendicular is the shortest.

c. The exterior angle so formed by producing a side of a triangle is not equal to the sum of the two opposite interior angles.

d. The bisector of a vertical angle of an isosceles triangle is perpendicular bisector of the base.

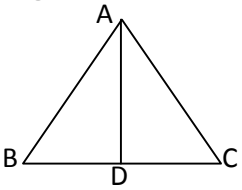
25. In the figure alongside BC of a triangle ABC is produced to D. If ACD=100^0, CAB=60^0, find ABC=?



a. 100^0 b. 80^0

c. 60^0 d. 40^0

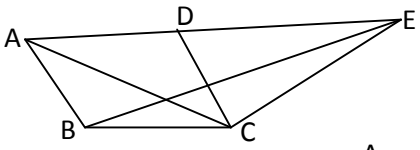
26. In the triangle ABC,AD″ BC base BC=4cm, height AD=3cm. What is the area of ΔABC?



a. $7cm^2$ b. $6cm^2$

c. $12cm^2$ d. $9cm^2$

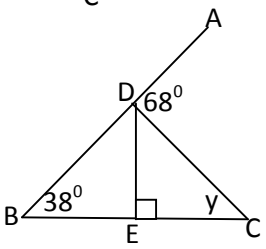
27. In the figure alongside, ABCD is a parallelogram and the area of ΔABC=$12cm^2$, then the area of ΔEBC is



a. $6cm^2$ b. $24cm^2$

c. $10cm^2$ d. $12cm^2$

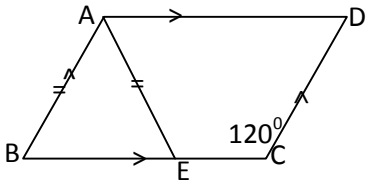
28. In the adjoining figure, what is the value of y.



a. 120^0 b. 60^0

c. 30^0 d. 150^0

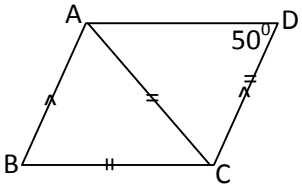
29. In the given figure, ABCD is a parallelogram, BCD=120^0 and AB=AE, then the value of AEB is



a. 60^0 b.120^0

c. 45^0 d. 75^0

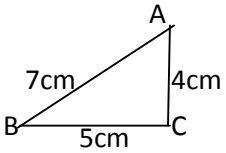
30. In the given figure, if AB ‖ CD, AC=BC=CD and ADC=50^0, then the value of ACB is equal to

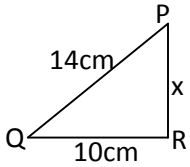


a. 110^0 b. 100^0

c. 80^0 d. 20^0

31. In the given figure,ΔABC ~ ΔPQR, find the value of x

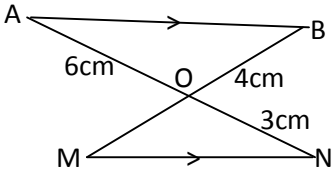




a. 8cm b. 4cm

c. 14cm d. 10cm

32. In the adjoining figure, AB ‖ MN, then length of OM is



a. 3cm b.4cm

c. 2cm d. 2.5cm

33. The condition for Pythagoras theorem is

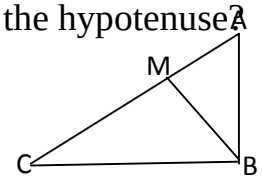
a. $h^2=p^2+b^2$ b. $p^2=h^2 - b^2$

c. $b^2=h^2 – p^2$ d. all of these

34. In the give figure, ABC= 90^0, which is the hypotenuse?

a. AB b. AC

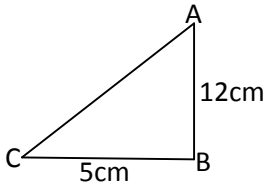
c. BC d. BM



35. In the given figure, AB =12cm, BC = 5cm, and **ABC**= 90^0, then what is the length of AC?

a. 13cm b. 14cm

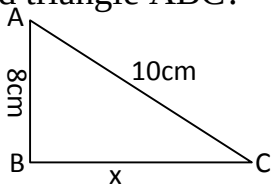
c. 12cm d. 17cm



36. What is the value of x in the given right angled triangle ABC?

a. 18cm b. 19cm

c. 2cm d. 6cm



37. Which is not a regular polygon?

a. Quadrilateral b. Equilateral Triangle

b. Regular pentagon d. Regular hexagon

38. Which is not property of regular polygon?

a. All sides and all interior angles of a regular polygon are equal.

b. All sides and all interior angles of a regular polygon are not equal.

c. The interior angle = $\frac{(n \, Z 2)}{n} \times 180^0$

d. The exterior angle = $\frac{360^0}{n}$

39. For a regular polygon, the interior angle is

a. $\frac{360^0}{n}$ b. $\frac{360^0}{2n}$

c. $\frac{180^0}{n/2}$ d. $\frac{(n-2)}{n} \times 180^0$

Where ‘n’ means no. of sides in a regular polygon.

40. Which one of the following is the exterior angle of the regular octagon?

a. 45^0 b. 48^0

c. 42^0 d. 40^0

The End

Appendix – B

Opinionnaire for Students

Dear students,

I am a student of M.Ed. majoring mathematics. I have tried to prepare a thesis on ‘’Factor Affecting the Girl’s Achievement in Geometry” for my Master’s Degree of Education.

There are 37 statements concerned with Geometry achievement. There is no right or wrong answer. The right answer is your own opinion of feeling. Please, read the statements carefully and give your opinion about the intensity of statement by putting tick mark (√) on any one of the five rating of each statement.

Here,

S.A. = Strongly Agree, A = Agree, U = Undecided, D = Disagree, S.D. = Strongly Disagree

Name:-…… Date:-

School:-…….. Sex:-

Class:-…… Roll no:-

Address:-……VDC/ Municipality. Ward no:-…..

S.N.	Statements	S.A.	A.	U.	D.	S.D.
1	I am not curious and active while teaching geometry.					
2	I enjoy when solving Geometrical problems.					
3	The class of geometry is less interesting than other topics of mathematics.					

4	Our teachers try to make the geometry lesson interesting.					
5	Geometry is an essential part of the study of Math.					
6	All mathematics teachers are trained on motivating students with different ability.					
7	Teacher always use teaching materials while teaching geometry.					
8	My parents do not manage all required materials for the study of mathematics.					
9	My parents treat unequally my brother and me.					
10	My patents do not discuss about my learning progress report with math teacher.					
11	My family manages tuition and coaching if necessary.					
12	I have no more time to study at home.					
13	Learning environment of mathematics is not better for me at home.					
14	School manages all the teaching materials for learning geometry.					
15	Teachers teach focusing the boys more than girls.					
16	Teachers are always suggestive to motivate girl's student to study geometry.					
17	I like to solve mathematical problem with my friends.					
18	It is difficult to ask the problem which has not been understood.					
19	The math teacher teaches regular in the class.					
20	I study geometry whenever I am free.					
21	I always complete math homework given by math					

	teacher.					
22	Teacher gives class work as well as homework and checks it.					
23	I keep on practice of already taught geometric problems.					
24	Course of mathematics is not complete in time.					
25	I feel difficulty in reading geometry key words or symbols.					
26	I feel hard to comprehend the overall meaning of geometrical problem.					
27	I myself have no trick to solve any problem of geometry.					
28	I need the help of teachers to solve any problem of geometry.					
29	I cannot find myself the wrong of any geometric questions.					
30	I always make mistake in solving the geometrical problems.					
31	Our society unequally treats boys and girls.					
32	There are literate people in our society.					
33	Female have inferior place in our society.					
34	Low role and opportunity of girls in society.					
35	Our society has no idea whether the subject matter of geometry is good or bad.					
36	The society and persons admire the girls in learning					

	geometry.					
37	The society does not inspire to learn geometry.					

Please give your opinion about any factors that affect girl's achievement on geometry.

……
……
……
……
…….....Thank you very much for your assistance in completing this opinionnaire as well as my research.

The End

Appendix - C

Guidelines for Interview with Secondary Math Teacher

Date of interview:-……

Name of teacher:-……..

Qualification:-…… Religious:-……

Trained/untrained:-…….. Sex:-…….

Teaching experience:-…… Age:-……

Address:-…….VDC/Municipality Ward no:-…...

The interview with mathematics teacher will take under the following topics.

- Teaching strategies of geometry
- Home environment
- School environment
- Probable error during geometric problem solving
- Social variables and girls achievement
- Study time

Interview questions for Teachers

1. What do you feel when you entered the classroom to take the geometry class?

2. Is solving the entire geometric problem by the teacher necessary? Should students do exercise themselves?
3. How about the achievement of your students in geometry subject?
4. What is the factor that affects students' achievement in geometry?
5. Does the teachers' qualification affect on the girls achievement in geometry?
6. How do the students' values and beliefs affect on learning geometry of girls student?
7. Did the home environment affect the girls achievement in geometry? Yes or No. Mention those factors.
8. What do you think about the girl student interest in reading geometry?
9. Do you use instructional materials while teaching geometry?
10. What types of materials do you use? Are those all materials sufficient?
11. Do you encourage girls' students to study geometry?
12. Is the teacher behavior helps to increase achievement in geometry?
13. Does the peers behavior or cooperation help to increase in geometry achievement?
14. What will be the cause of low achievement of girl's students in geometry?
15. Do you review the geometrical topic from time to time?
16. Is there any discrimination between boys and girls in your class?
17. Social variables are also the important factor that affects the achievement of geometry. Do you agree? Give reasons to support your view.
18. In your opinion do you think the other probable factors could also affect the girl's achievement on geometry?

19. Are there any comments or suggestion to improve girl's achievement on geometry?

The End

Appendix- D

Item Analysis

Students / ems	Upper 27 percent Students										Lower 27 percent Students										P-Value	D-Value	Remarks
	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10			
1	1	1	0	1	1	0	1	1	1	0	0	0	1	0	0	0	0	0	1	0	45	0.50	
2	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	70	0.60	
3	0	1	1	1	1	1	1	1	1	1	1	0	1	0	0	1	0	0	1	0	65	0.50	
4	1	1	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	25	0.30	Modified
5	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	20	0.20	Modified
6	1	1	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	1	0	0	30	0.20	
7	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	1	0	1	0	30	0.20	
8	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	0	1	75	0.30	
9	0	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	1	0	1	0	75	0.30	
10	1	0	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	0	0	0	70	0.40	
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Cancelled
12	1	1	1	1	1	1	0	1	1	1	0	1	1	1	1	1	0	0	0	0	70	0.40	
13	1		1	1	1	0	1	1	1	0	0	1	0	0	1	0	0	0	1	1	55	0.30	
14	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	1	20	0	Cancelled
15	0	1	0	1	1	0	0	1	0	0	0	0	0	0	1	1	0	0	0	0	30	0.20	
16	1	1	1	0	0	1	1	0	1	1	0	1	0	1	0	0	1	0	1	1	60	0.20	
17	0	0	1	0	1	1	1	1	0	1	1	0	0	0	0	0	0	0	0	1	40	0.40	
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19	0	1	1	1	1	1	0	1	1	1	0	1	0	0	1	1	0	1	0	0	60	0.40	
20	1	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	1	0	30	0.20	
21	1	1	1	0	0	1	0	0	0	1	1	0	1	1	0	0	0	0	0	0	40	0.20	
22	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	15	0.10	Cancelled
23	1	0	0	1	0	1	1	1	1	1	0	0	0	1	0	0	0	0	0	1	45	0.50	
24	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	1	1	1	1	0	75	0.50	
25	1	1	1	1	0	0	0	0	1	0	0	0	0	0	1	0	1	0	0	1	40	0.20	
26	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	0	1	1	0	80	0.20	Modified
27	1	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	0	1	30	0.20	
28	1	1	1	1	1	1	0	0	0	1	0	1	0	0	1	1	0	1	0	0	55	0.30	

29	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	25	0.30	Modified
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Cancelled
31	1	1	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1	0	30	0.20	
32	1	1	1	1	1	0	1	1	0	1	1	0	1	1	0	1	0	0	0	0	60	0.40	
33	1	1	1	0	0	1	1	0	1	1	1	1	0	0	1	0	1	0	0	0	55	0.30	
34	0	0	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	25	0.30	Modified
35	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	1	15	-0.30	Cancelled
36	1	0	0	0	1	0	1	1	1	1	0	0	1	0	0	0	1	0	0	1	45	0.30	
37	1	1	0	1	0	0	0	0	1	1	0	1	0	1	0	0	0	0	1	0	40	0.20	
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40	1	0	0	1	1	0	1	1	0	1	0	0	0	0	1	0	1	0	0	0	40	0.40	
41	1	1	0	0	1	1	0	1	0	0	0	1	0	0	0	0	0	1	0	0	35	0.30	
42	1	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	25	0.30	Modified
43	1	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	25	0.30	Modified
44	1	1	1	0	0	0	1	0	0	1	1	0	0	0	0	1	0	0	0	0	35	0.30	
45	1	1	0	0	0	1	1	0	1	0	0	0	1	1	0	0	1	0	0	0	40	0.20	