

## **Chapter I**

### **INTRODUCTION**

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

Mathematics is an essential part of school curriculum. So, every student should study it and gain better achievement. For the improvement of students' achievement in school mathematics education, many researchers have been done to identify the variables that influence the achievement scores of the students. It is believed that girls are weak in math in comparison to boys with respect to educational achievement. There are many causes of backwardness of girls. Among them, social factor is one. Not only in developing countries but also in developed countries girls come up to get education and social equality after long time. That is why; they have not contributed more in the field of education including the area of mathematics education. They have been unable to bring their names in the place of Pythagoras, Euclid, Archimedes, Newton and Leibniz, and soon. As mathematician it requires sufficient time and labour to study and research mathematics. Specially in our context, girls don't get sufficient time for study. It is one of the major reasons for girls to be backward.

The participation of woman is very low in economic, intellectual, social and political sector in society, hence involvement of girls in education is very low as compared to boys. This position of girls in labor market is partly mirrored by their performance in educational system. So, educationist has begun to feel that education up to the middle standard is not sufficient for the citizen, so the policy of compulsory education for the people has been announced by most of the countries in the world to

raise the gender equality in every aspect. The founding of Harvard College in 1636 demonstrates that the early set up was important to a liberal education but at that time this was not possible because, college was beyond the reach of most men because of the lack of social status and of all women by virtue of their sex (Astin, 1974)

Educational opportunities generally available to boys and girls are clearly illustrated by the literacy rates of the two groups. In 1790, perhaps only half as many women as men were literate (Senk, 1989). There was ambivalence about the need of girls education while parents realized that education could give independence to a daughter who remain single. So, there were fears that too much education might spoil the chance of marriage.

Mathematics is taught as a compulsory subject at each level of school education system in Nepal whereas optional mathematics is taught as an additional subject for secondary level. In Nepalese context, mathematics is considered as a complex subject and has become a cause of failure for the students in school education in general. Studies as well as the researcher's own empirical observation have created a query that girls and disadvantage family children are greatly affected by the failure rate of Maths in different levels of education. In addition to this, many of the students are troubled by the level of understanding and achievement in their learning, too. The experience of failure has created less interest in students in studying mathematics. Data as well as simple observation show that selection of mathematics as an additional subject (Optional Mathematics) among the disadvantaged group of students and girls is comparatively lower even in urban areas. Most of the girls students at secondary level do not like to select optional mathematics due to the possibility of failure in examination. Girls' dislike to this subject has become a great

problem to educationists and stakeholders. There is now an equity theory which advocates that both male and female should have chance of getting education as social importance. When girls are distracted from mathematics, it is certain that women could not get the position of scientist and the domains of works which, by tradition, is considered as a male dominated. The students in general, and girls students in particular, have negative attitude towards mathematics subject (Senk, 1989).

The studies conducted by Cappa and Cox, 1969; Dutton 1951, 1954, 1962; Kane, 1968) have investigated the attitude of teachers, prospective teachers and students towards mathematics. The implication is that, if we can improve students' attitude towards mathematics education, it could help to raise their achievement in mathematics education. Norton (1959) states that college students' attitude towards mathematics is closely associated with their conception of parental attitude towards mathematics.

In the history of mathematics, we can find many male mathematicians such as Euclid, Archimedes, Apollonius, Kelper, Pascal, Descartes, Bernoulli, Euler, Gauss, etc. However, it is very difficult to find female mathematicians. We have to agree with the fact that adequate situation for the improvement of mathematics is meager. This may be one of the main causes to keep the girls to stay back in the history. Nowadays, girls have got equal opportunity for studying and performing other activities.

Most of the studies done so far are the comparative study of achievement in different aspects of school mathematics at different level. However, none of them have made an effort to study the factors that cause the low participation of girl students in mathematics class. Hence, the study would try to focus on the factors

responsible for low participation of girls in mathematics.

### **Statement of the Problem**

The participation of girls students in mathematics subject is very low in the context of Nepal. They do not select mathematics as a major subject and also don't get admission in the faculties like Engineering, Science and Technology. For these faculties, it is necessary to have optional mathematics subject at secondary level. However, only few number of girls student select optional mathematics. The factors that influence the girls students in selecting optional mathematics have not yet clearly been determined on the basis of the research. While we observe the position of girls students in higher education, there are a few number of girls involved in teaching and learning mathematics. When we talk of the female teachers, the female mathematics teachers and lectures are sporadic which we can not see in our university campus in comparison to the other subjects. The low enrollment of girl students in mathematics at higher education may be the cause of low participation in mathematics subject in school education. So, the researcher is interested to explain the causes of not selecting mathematics as an elective subject at secondary school level. Thus, the study would mainly concern to find the low participation of girl student at grade IX in mathematics. It would also focus on the factors affecting the low participation of girls in the optional mathematics.

This research primarily tries to answer the following research questions:

- ) What are the factors that affect the participation of girls in optional mathematics ?
- ) What is the difference between the participation level of rural girls and urban

girls in mathematics ?

### **Objectives of the Study**

The objectives of the study were as follows:

- ) To find the out factors that affect the participation of girls in optional mathematics.
- ) To compare the participation level of girl students of rural school and urban school.

### **Significance of the Study**

The results of this research would provide important knowledge that would enable teachers, parents, society members and school family to eliminate gender differences in participation in mathematics education. The attitude and related stereotypes of young females need to be identified in order to address the issue of taking optional mathematics subject and learning participation in the classroom. An important reason for studying to find that attitude and gender role stereotypes in the mathematics education of young females is to find ways to encourage females to select mathematics. The positive attitude towards mathematic is also an important educational outcome, regardless of achievement level (Benbow and Standley, 1990). As teachers are made more aware of the attitude of their students, they should be able to focus on the causes, effect, and consequences of these attitude and ways to address them in their teaching.

Most of the girls students in secondary level do not select or hesitate to select optional mathematics as an optional subject. It is not known what factors are affecting

girl students participation in optional mathematics. Thus, the study will be significant for the teachers to identify some of the factors that could affect the girls participation in optional mathematics at secondary school education. This knowledge helps to manage pedagogy for creating girls' positive attitude towards mathematics and selecting optional mathematics as their elective subject. This could also increase women's participation in science and technology field. Thus, in this sense the purpose of the study would have the following significance

- It would give information about the participation of rural and urban girl students in optional mathematics.
- It would help to find the factors that affect the rural and urban girls' participation in optional mathematics.
- The finding of this study would be helpful to pay attention towards concerned agencies to promote participation level of rural and urban girls in optional mathematics.

### **Delimitation of the Study**

This study had the following delimitations:

- ◆ This study was delimited to Bara district only.
- ◆ This study included only grade IX students of ten public schools of Bara district.
- ◆ This study was limited to only twenty mathematics teachers
- ◆ The study was limited to girl students only.

## Definition of Related Terms

- ) **Participation** : The term participation in this study is defined as the activity of enrolling in the particular class and choosing optional mathematics as an elective subject for a particular academic year.
- ) **Public schools:** The schools which are fully financed by the government are called government public school in this study.
- ) **Family Background** : Family background in this study particularly involves father's and mother's educational attainment and study environment in the family.
- ) **Girls' Interest** : This refers to interest of the girl students in selecting optional mathematics.
- ) **Prior Achievement** : This refers to the achievement of the girl students in mathematics in prior classes.
- ) **School Related Factors** : The variables such as teachers' behaviour, prior achievement and peer group influence are taken under school related factors. These variables affect the attitude of girl Students in selecting optional mathematics.

## **Chapter - II**

### **REVIEW OF RELATED LITERATURE**

Literature review is one of the essential tasks to conduct any research. According to Kothari (1995, p. 30), the literature review is an integral part of the entire research process and makes a valuable contribution to almost every operational step". It widens the horizon of the knowledge of the researchers. I, therefore, have made an effort to shed light on some theoretical aspects of the study.

#### **Review of Theoretical Literature**

The theoretical discussion is needed for the interaction of the finding of the study. There are many theories about learning and development of children such as cognitive, behavioristic, humanist and social constructivist. Learning means the relatively permanent change in behavior which occurs as a reinforced practice. According to the behaviorists, learning is the stimulus-response process. They mention that learning is an interaction between human being and external environment.

Vygotsky has developed "socio-cultural theory" and believed that children are active seekers of knowledge, but he did not view them as solitars agents in this theory. Constructivism is basically based on observation and scientific study about how people learn. It says that people construct their own understanding and knowledge of the world through experiencing things and reflecting on those experiences when they encounter something new. We have to reconcile it without previous ideas and experiences which may be changing what we believe or may be discarding the new information as irrelevant in any sector. We are active creators of



our own knowledge. To do this, we must ask questions, explore and assess what we know. Constructivism stands on its three maxims that are learners learn knowledge from their active participation, learners gain knowledge reflecting on their own action and learners gain knowledge when they try to convert their solution to others. This shows that the better learning results from the students' active participation and their own readiness for study.

Theoretically, the participation of girl students in optional mathematics may depend on different variables. Generally, participation of girls in optional mathematics is specially influenced by teaching learning process, home environment, school environment, social variables, errors in problem solving, time variables and attitude towards optional mathematics. Under teaching learning process, teachers' qualifications, interest of learners, expectations of teachers, views and beliefs of teachers about girls' participation are must. The variable related to 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 physical facilities, students' number in classroom, gender bias, teachers and peers behaviours are considerable elements for doing better or worse in optional mathematics. Social variable is also non separable and important factor on participation of girls in optional mathematics. This includes social system, cultural customs, and traditional effects of gender in society. Errors in problem solving and time variable also play significant role on girls' participation in optional mathematics.

From the above discussion, it is obvious that there are many factors that are responsible to cause low participation to give in the classroom. Generally the attitude of the students towards course create confusion to what to choose to study. According

to Rao (2004), students who have positive attitude have achievement higher than students who have negative attitude towards mathematics. Similarly, Gotame (2005) stresses that there is correlation between parents' beliefs, students' beliefs and achievement in mathematics. Parents preserve gender bias in mathematics. He also states that mathematical thinking and doing depends on the parental status and beliefs. The upper caste students have higher achievement in mathematics due to their parents' high expectation towards mathematics and school system. Parental belief is the main motivation factor in learning of mathematics.

Similarly, Campbell (1986) is of opinion that girls' perceptions on mathematics as a difficult subject achievement, and participation in advanced mathematics courses. Hanson (1992) describes that both girls and boys define mathematics as "male" as early as the second grade, because girls also think mathematics is more difficult than boys do. He suggests that girls are less likely to enroll in mathematics courses if presented the option. Fennema and Sherman (1978) state that females have a motivation to avoid success in area believed to be traditionally male dominated. Females hold lower self-expectation for success in academic areas that they do not consider to be gender appropriate.

It is generally thought girls both like and spend more time than boys in reading, writing and participating in activities related to arts and crafts, domestic skills, and drama. Boys, in contrast, spend more time engaged in sports working with machines and tools, and involved with scientific math related hobbies. These differences may have a direct effect on training girls and boys, seek out on the skills they acquire during childhood (Eccles, 1987, p. 62). From these statements, it seems that girls are directly and indirectly influenced by different factors and show very low

participation in mathematics class. They deserve ideas that mathematics is specially for male as it is very hard to understand.

### **Empirical Literature Review**

This chapter presents the review of books, journals, reports of the previous researches and other published sources. The major theses, journals, reports reviewed are as follows:-

**Subedi (2000)** carried out study entitled "A comparative study on the achievement level of students taught by male teachers and female teachers. His major objective was to find out the achievement level of students taught by male teachers and female teachers. He used primary source to carry out his research. He selected eight students from Kathmandu valley through purposive non-random sampling procedure. Questionnaire and test items were the main tools for his study. His research showed that the students taught by male teachers did better than the students taught by the female teachers.

**Tiwari (2002)** studied on the "Attitude of parents towards mathematics. His major objective was to find out the attitudes of both farmer and non-farmer parents towards school mathematics. He selected twenty parents through purposive sampling. He used interview as tools for data collection. His finding shows that both farmer and non-farmer parents had positive attitude towards the school mathematics, farmer and non-farmer parents had positive attitudes towards their male child and female child about the school mathematics. However, farmer and non-farmer parents had greater attitudes score towards their male children than female children in secondary school mathematics.

**Bastola (2007)** had conducted research entitled "Factors affecting on the achievement of Dalit students in mathematics. A case study in Kaski district." The main objective of this study was to identify the factors affecting on the achievement of Dalit students in mathematics. Only one school of rural area of Kaski district was taken for the sample, where four students of grade nine were chosen according to gender once and then socio economic background. He used test item and interview schedule as a tool. At the conclusion, he found that the major factors which determined the achievement of Dalit students in mathematics were poverty, expensive education, social attitude social tradition, social believers, responsibility of homework, lack of knowledge, lack of security, no interest in education, lack of motivation and health status.

**Dhakal (2010)** carried out a research on "Factors affecting mathematics achievement of Rai students in Khotang district." The major objective of his study was to find out the factors that cause the underachievement of Rai students. He used non-purposive random sampling procedure. Test items and questionnaire were major tools for data collection. He found that the children of Rai communities who learned mathematics in the mother tongue at primary school level performed better on mathematics concept than those who did not learn mathematics in their mother tongues. Thus, the researcher found that there were many problems or factors which affected achievement of mathematics learning. He gave his conclusion for this study that the factors like parents, education or economic condition, environment, etc. were exponentially responsible for low mathematics achievement.

**Sahi (2010)** carried out a research on topic "Factors Affecting Achievement of Dalit Students in Mathematics: A Case Study in Doti District". The major objective of

this research was to identify factors affecting mathematics achievement. Forty mathematics teachers and parents and six peer groups were chosen for the study. He used test item and interview method as a tool for research. His finding showed that achievement of Dalit students were less than non Dalit students irregularity is one of the causes being Dalit students fail in the mathematics subject.

**Chapain (2011)** carried out a research on "A study on mathematics achievement of Girl students in Kailali district." The purpose of his study was to find out the achievement of Girl students in compulsory mathematics. He selected sixty Girl students of grade eight through non-purposive random sampling procedures. He used test item and interview main tools for the study. Researcher found that students were found to be proper in the test on comprehensive, writing with understanding and dictation exercises. The performance of students in various aspects of the authentic portion of the test showed that the students were weak in understanding the place value of numbers, the concept of fractions and the application of four simple rules

However, some of the studies mentioned above are similar to my study, they haven't focused on the factors related to parents and teachers. They haven't also carried out their study on the rural and urban girl students. Most of the studies are related to both private and public schools. However, my study is merely restricted to public school of Bara district.

### **Implication of the Review for the Study**

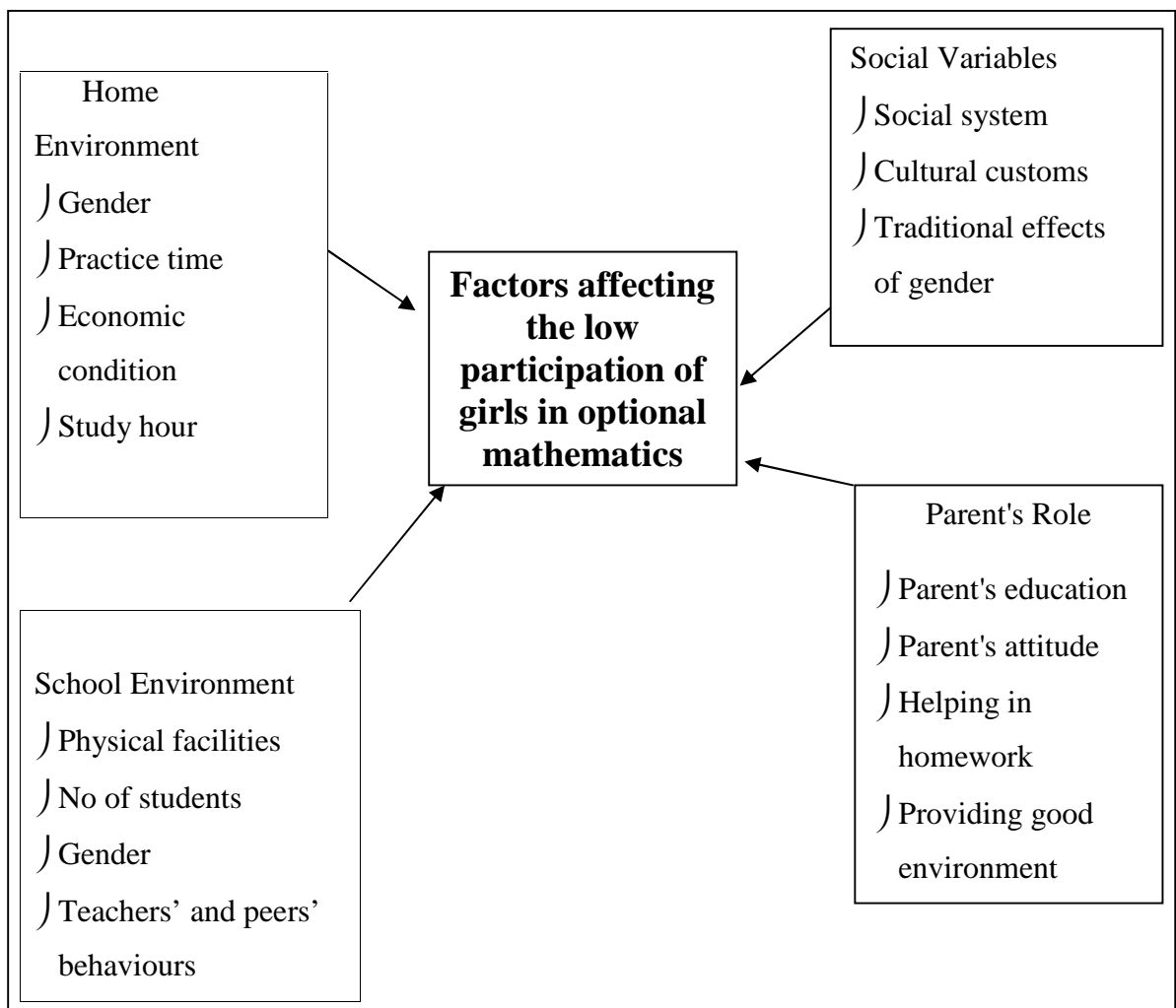
In the process of conducting this research, I reviewed different theses in the Department of mathematics Education. Not only those theses but also books and other related materials were reviewed. I got lots of ideas from theses and other books.

They provided knowledge on the theoretical aspects of girl participation in mathematics classroom. The researcher had used survey research design to conduct this research. Therefore, I got ideas on the process of survey design after reviewing the book by Nunan (2010). In the same way, specially the study conducted by Chapain (2011) helped me to design questionnaire as the tool of data collection. The study conducted by Dhakal (2010) expanded my horizon of knowledge on the methodological aspects of my study.

## Conceptual Framework for the Study

This study would be related to the factors affecting the low participation of girls in optional mathematics. Therefore, I use the following conceptual framework for improving my study.

**Fig 2.1: Factors Affecting the Low Participation of Girls in Optional Mathematics**



Source: Bastola (2007, p. 21)

The participation of girl students in mathematics may depend on different variables. Generally, participation in optional mathematics specially in rural girls influenced from teaching learning process, home environment, school environment, social variables, errors in problem solving, time variables and attitude towards

optional mathematics. The variable related to 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 physical facilities, students' number in classroom, gender bias, teachers and peers behaviours are considerable elements for doing better or worse in optional mathematics. Social variable is also non separable and important factor on participation in optional mathematics. This includes social system, cultural customs, and traditional effects of gender in society. The above described variables together constitute the girls' participation in optional mathematics.



## **Chapter III**

### **METHODS AND PROCEDURES**

This chapter presents the procedure of the study, which involves the design of the study, population, sample and sampling strategies, study area/field, data collection tools, data collection procedure and data analysis and interpretation procedure. It also explains the procedure of data collection. I adopted the following methodologies for this research work.

#### **Design and Method of the Study**

The design of this study is survey research design. Survey research studies a large and small population or universe by selecting and studying sample chosen from the population. According to Cohen and Manion (1985):

Surveys are the most commonly used descriptive method in educational research, and may vary in scope from large scale governmental investigations through to small-scale studies carried out by single researcher. The purpose of survey research is generally to obtain a snapshot of condition, attitudes, and/or events at a single point in time. (p.140)

Thus, from the above explanation, we can say that survey research is carried out to highlight important educational issues. Here, the data are collected from the sample which is generalizable to the whole population. According to Nunan (2010, p. 96), "It is a type of research design which is used to obtain a snapshot of condition, attitudes and event at a single point of time." Putting it in another way, we can use such design to get factual information regarding various subjects. It is a non-

manipulative study in the sense that the researcher does not control the situation. Therefore, it is also known as natural study. Normally, it is carried out to test the hypothesis rather than constructing hypothesis. In this research design, researchers construct the hypothesis before collecting the data. Therefore, it is also known as hypothetico-deductive method. Researchers collect the data by using any research tool to test the hypothesis at a single point of time. Thus, it can use triangulation approach. This is a descriptive study, not an explanatory study in the sense that researcher does not go beyond the data collected. Sample size in this research is often larger than the other types of research. It is not a recursive study because all research tasks do not go simultaneously but it is a stepwise study. Since my study was related to educational issues and tried to get factual information, the use of survey research design was reasonable for it.

As research is a systematic process of investigating ideas, we cannot conduct it haphazardly. In order to conduct a research activity, the researcher had to follow the systematic process.

### **Population and Sample of the Study**

The population of the study was all the girl students of grade IX from Bara district. The sample of this study consisted of 120 girl students from ten public schools, consisting of both rural and urban schools. Sixty girls were selected from five schools of rural area and the same number of girls were selected from five schools of urban area. The informants were selected through non-purposive random sampling procedure from ten public schools. Similarly, 20 mathematics teachers were also selected as the informants for the research. Two teachers were selected from each school of both urban and rural area.

## **Study Areas/Field**

The area of this study was Bara district and the field of it was the factors affecting the low participation of girls in optional mathematics.

## **Data Collection Tools and Techniques**

There are many tools for qualitative or descriptive research to get information from the informants. The researcher adopted interview and questionnaire as the tools of data collection.

## **Data Collection Procedures**

The researcher visited the sampled schools with questionnaire to collect data and information. Researcher explained the purpose of the visit to the headmaster. The students were given questionnaire. Researcher explained and clarified confusion that increased understanding of the questions.

The researcher visited the sampled schools with guidelines for interview schedule. Mathematics teachers were also interviewed to obtain data regarding factors affecting the low participation of girl students in classroom.

## **Data analysis and Interpretation Procedure**

Simply, data interpretation is the systematic process of presenting the raw data and analyzing them to show their effects. The analysis of data is important thing while we are preparing research report. In this report, primary data collected from primary source through questionnaire and interview were analyzed and interpreted by apply inferential statistics like mean weightage.

## **Chapter IV**

### **ANALYSIS AND INTERPRETATION OF DATA**

This study was carried out with a view to detecting the factors that were responsible to cause low participation of girls in optional mathematics. Questionnaire and interview guidelines were used as the tools to collect data for this study. These data collected from the questionnaire were analyzed by using weightage mean where positive variables were multiplied by 3, 2, 1 and negative variables were multiplied by 1, 2, 3 to see whether the weightage is more than two or less than 2 to find out the effect of the factor (See Appendix-III). The data collected by the researcher were analyzed under the headings like (i) Student Related Factors, (ii) Teachers Related Factors, (iii) School Related Factors, (iv) Home Related Factors and (v) Society Related Factors

#### **Student Related Factors**

Learning of mathematics is dependent of the preparedness of the students in the learning environment. That is to say, the learning depends on the readiness of the learners. The more the learner become active and attentive in the classroom, the effective learning takes place. Therefore, to find out the factors that affect the learning of the learners, I have used separate questionnaires containing eight items of the student related factors that cause low participation of rural girls students in optional mathematics . The students were provided with questionnaire to select and tick the options. of the items in their own ways.

The final results of the responses they gave have been shown in table 4.1 below.

**Table 4.1**  
**Weighted Means for Student Related Factors**

S.N.	Items	Weighted means	
		Rural girls	Urban rural girls
1	I take mathematics as a hard subject	2.28	2.23
2	I have no basic knowledge in mathematics	1.73	1.88
3	I feel very difficult to ask questions with teachers	2.11	2.02
4	I always complete homework given by teachers	1.71	2.46
5	I study mathematics when I am free	1.75	2.05
6	I feel difficulty in reading key words and symbols	1.31	2.13
7	I feel hard to comprehend the overall meaning of mathematical problem	2.43	2.41
8	I also learn mathematics from my friends	1.31	2.58

The above table reveals the weighted mean of the students related factors influencing the participation and achievement level of girl students as held by both rural and urban girl students were found to be greater than mean weightage of two for the item number 1, 3 and 7. It implies that both groups agreed on factors like mathematics as a hard subject, difficulty in asking questions with teachers and feeling hard to comprehend the overall meaning of mathematical problems as the influencing factors to cause the low participation of girl students.

For the urban girl students, the weightage mean was found to be greater than two for the items 4, 5, 6 and 8 where as it was less than two for rural girl students. It

indicates that the opinions of the rural girl students and urban girl students differed for the factors like always completing homework given by teachers, studying mathematics at leisure time, difficulty in reading key words and learning from others.

In addition, interview schedules were held with four teachers regarding the causes of low participation of girl students in mathematics. Teachers pointed out that student's irregularity in the class, and considering mathematics as difficult subject were especially responsible for causing low participation in class.

I asked the teachers "What is the factor that affects the participation of girl students in optional mathematics classroom and they answered as:

*T<sub>1</sub> : In my opinion, girls have pre conception that mathematics is real very hard subject and this is the reason that they do not like to take mathematics.*

*T<sub>2</sub> : Traditionally speaking, girls like doing work that is entertaining and easy. They do not like to practice hard work. Comparatively, mathematics is less entertaining than other subjects. So they do not like to choose mathematics.*

Thus, it may be interpreted that students' irregularity, low participation and considering mathematics as a hard subject were the main causes of low participation of rural and urban girl students.

### **Teacher-related factors**

Teachers' qualification, interest of learners, expectation, views and beliefs toward optional mathematics constitute the teaching learning process. Teachers' qualification as determined by education, experience, expertise and licensure has been shown to be the single most significant factor contributing to students participation.

Interest of learners is also an important determining factor in students' participation. If students do not have curiosity to learn, the teacher can not teach. The expectations of teacher, parents and students themselves have a significant effect on participation levels. Different researches show that students who are expected to learn are more likely to participate in school. It has been shown that teachers generally tend to have lower expectations from minority children and children from poor families (Games and Davis, 1990). Students' attitudes and beliefs also effect the participation and 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 can play a pivotal role in girls' relationship with mathematics. The following seven statements define the teaching learning process that can influence girls' participation in optional mathematics. Questionnaire containing seven items were given to both urban and rural girl students. They ticked the items in their own ways. The questionnaire items focused on teacher-related factors that cause low participation of girl students in mathematics. Their responses have been presented in the following table:

**Table 4.2****Weighted Means for Teacher-related Factors**

S.N.	Items	Weighted means	
		Rural girl students	Urban girl students
9	Teacher's role in mathematics class is as a facilitator	1.56	1.5
10	Teachers do not make class interesting	2.6	2.23
11	They use teaching material in classroom	2.28	2.40
12	Teachers focus on boys more than the girl	1.36	1.12
13	They discuss on pre concept related to the exercise before beginning the lesson.	2.14	2.6
14	Teachers make problem clear	1.16	1.86
15	They take unit test at the end of each unit	1.06	1.67

Table 4.2 shows that weighted means for teacher-related factors influencing the participation and achievement of students as held by both rural girl and urban girl students were found to be greater than two. Both groups agreed that not making class interesting, use of material and references in class and poor classroom performance were the causes of low participation of girl students in mathematics.

The weighted average of urban girl students was found to be greater than two for the item numbers 10, 11 and 13 where as the rural girl students' opinions differed for the factors like lack of reference materials, teacher's focus on boys and teacher's role as a facilitator in the classroom.



The weighted mean scores of the items numbers 9, 12, 14 and 15 were found to be less than two for both rural girl and urban girl students. Consequently, making problem clear and teachers not giving test to the students were factors disagreed by both groups of students.

The next tool of data collection were the interview schedule. The interview schedule was held with four teachers. The interview result shows that teacher agreed that lack of the use of teaching materials in mathematics, lack of motivation, lack of students centered teaching methods, lack of continuous assessment and lack of planning were the major cause of low participation of girl students in mathematics.

In addition to quantitative information the interview was taken form the mathematics teacher to derive qualitative information regarding the influence of teaching learning process in optional mathematics.

I asked them "Do you discriminate between boys and girls in your classroom?" and they presented their views as:

*T<sub>1</sub> : I am not mentally prepared to discriminate between boys and girls. But practically, boys are involved more in classroom activity than girls. We rarely ask girls to do practice on board.*

*T<sub>2</sub> : Conventionally, we have been influenced to focus on boys more than girls. SO, we often neglect their participation in different problem solving activities.*

*T<sub>3</sub> : Grils often feel shy in the classroom and treat their teachers as the holy person. This is the reason that we focus more on boys than girls.*

Thus, according to the information from the mathematics teacher, the main influencing factors on participation of girls were the interest of learners, teachers' qualification and method of teaching. Due to lack of teaching materials, limited time period, the teacher can not use sufficient teaching materials or teaching aids. Most of the teachers use traditional lecture method. Because of this traditional method, they do not ask questions directly to the teacher less active and interactive.

Hence, from the result analyzed in quantitative techniques and responses of math teaches in interview, it is concluded that the teaching learning process are main influencing factors in girls' participation in optional mathematic.

### **School-related Factors**

Researches show that planners should give serious consideration in designing learning environments outside of the traditional classroom. They should focus the exterior design of school buildings. The classroom lighting, colour choices and windows play a significant role in the participation of students. The teaching materials managed by school, number of students in classroom, teachers' behaviour towards girl students, peers behaviour with their friends, collaboration, sharing of knowledge, question 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' participation in optional mathematics. To find out to what extent the school-related factors were responsible to cause low participation of girl students in mathematics, questionnaires were given to the girl students.

There were 5 school related items in the questionnaires and the responses of the students have been collected and analyzed below.

**Table 4.3****Weighted Means for School Related Factors**

S.N.	Items	Weighted means	
		Rural girl students	Urban girl students
16	Our school does not manage special class for girls	2.1	1.67
17	There is a lack of proper attention on the students' problems	2.46	1.58
18	School does not create congenial environment for girls	2.09	1.2
19	There is a lack of students friendly class.	1.9	2.4
20	School lacks of female teachers in school.	2.67	2.13

According to table 4.3, the responses of urban girl students about the items numbers 19 and 20 were found to be greater than weighted means two. This implied that urban girls students agreed that the school-related factors like unfriendly school environment and lack of female teachers are highly responsible to cause low participation of girl students in mathematics.

Similarly, the responses of the same group of students to the items numbers 17 and 18 received fewer score than the weighted means two. It signified that urban girl students opined that the item-not managing special class for girl students, lack of proper attention and involvement of girls are less responsible to cause low participation of girl students in mathematics.

The responses of the rural girl students to the items numbers 17, 18 and 20 were found to be higher than the weighted mean two. This meant that the rural girl

students agreed that the factors like lack of the students friendly classroom management, not managing special class for girl students less focus on girls, lack of female teachers were responsible for low participation of girl students.

Interviews were taken with the mathematics teacher to get the qualitative information concerning the role of school environment on girls' participation in optional mathematics. Most of the teachers' views were that the low school facilities, limited teaching materials and culturally biased view about girls students are the main cause of low participation in optional mathematics.

I asked the teachers to present their views on 'how does school environment cause the low participation of girls in optional mathematics class and they responded in the following ways:

*T<sub>1</sub> : School environment is really responsible for promoting girls' participation.*

*However our schools do not have any provision of special classes for girls students to encourage them to do practice to make the course easy.*

*T<sub>2</sub> : In my opinion, the friendly classroom environment and the availability of proper physical facilities in the school can provide a good environment for girl students. But our schools do not have these facilities. So there is low participation of girls in mathematics class.*

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 participation in optional mathematics.

## **Home Related Factors**

Home is considered as a foundation of education. Theoretically, it is assumed that the participation of girls in optional mathematics is highly influenced by the home environment. Parents' education, socio-economic conditions of family, study hour at home, practice time of optional mathematics and gender bias in family are generally considered as the home environment. The participation of child depends not only on the part 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 participation. Various researches have shown that higher the socio-economic status of family have the greater children participation. The roles, responsibilities, constrains, opportunities, practice time given by family to daughter in home also plays the vital role on the participation of girl in optional mathematics. The questionnaire containing five items were asked to find out the role of the parents in influencing the mathematical achievement level of girls students. Their responses are presented in the following table:

**Table 4.4**

**Weightage Mean for Home Related Factors**

S.N.	Items	Weighted means	
		Rural girl students	Urban girl students
21	Our parents do not manage all the required materials for the study of mathematics	2.4	1.68
22	They treat unequally son and daughter	2.43	1.54
23	Our parents do not discuss about my learning progress report with math teacher	2.09	1.3
24	They manage tuition and coaching if necessary.	1.6	1.8
25	Learning environment is not better at home.	2.64	2.10

The above table shows that the responses of urban girl students about the items numbers was 25 were found to be greater than weightage mean two. This implies that home related factor like home environment is not better at home was responsible for low participation of urban girls.

Similarly, the weightage of responses of the rural girl students to the items numbers 21, 22, 23 and 25 were found to be higher than mean two. This implies that they viewed that home related factors like not managing required materials for the study of mathematics, unequal treatment of girls and boys, not discussing about the progress of girls with math teachers and unreasonable home environment were responsible factors for low participation of girl students.

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

The teachers were interviewed on how parents at home affect the girls' participation in mathematics class? and they responded as follows:

*T<sub>1</sub> : The uneducated parents can not provide help to their child at home and this is the reason the girls who can not solve the problems feel hard and neglect mathematics.*

*T<sub>2</sub> : What I believe is that if parent encourage girls at home to study mathematics, they can show the ardent interest in it. Unfortunately, most of the parents do not do so. Consequently, girls have low participation in mathematics.*

Hence from the above analysis, it can be concluded that parents education, parents' behaviors, study time at home are the influencing factor on participation of girls in optional mathematics. Due to the less priority given by the parents to their daughter in learning mathematics is main cause of low participation in optional mathematics.

### **Society Related Factors**

Theoretically, it was reviewed that culture and social factors are responsible for the under participation of girls in optional 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' participation in optional mathematics. In olden days, boys were educated/exposed to the society but girls were restricted to 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 questionnaire containing five questions related to society were present to find out the role of society in influencing the participation of girl students. The responses of the students are presented in the given below table:

**Table 4.5**  
**Weightage Mean for Society Related Factors**

S.N.	Items	Weighted means	
		Rural girl students	Urban girl students
26	Females have inferior place in society	2.51	2.43
27	Girls do not get opportunity in society	2.11	1.2
28	Society has no idea whether the subject matter of mathematics is good or bad	1.36	2.26
29	Society does not admire girls who studies mathematics	2.61	2.11
30	The society does not inspire to learn mathematics	2.11	1.53

According to table, the responses of both rural girl and urban girl students to the item number 26 and 27 were found to be greater than mean two. This implies that both rural girls and urban girls agreed that inferior position of female in society and



their low role and opportunity were the responsible factors for the low achievement of girl students.

Similarly, the weightage mean of responses of the rural girl students to items number 26, 27, 29 and 30 were found to be greater than mean two. According to them, the factors like not inspiring the girl students to study mathematics, low role of girls and not admiring girls to study mathematics were responsible factors for low participation of girl students.

Beside quantitative testing, qualitative information was collected from mathematics teachers regarding the relation of social variables for girls' participation.

I asked them 'how do social variables affect the participation of girls in mathematics classroom?' and they responded differently. Their responses have been presented below:

*T<sub>1</sub> : Society often discourages girls from learning mathematics posing views that mathematics is hard and difficult for girls.*

*T<sub>2</sub> : In my opinion, society is preoccupied with the views that girls are sent to others' home and are supposed to be an entity within four walls of house. So they avoid encouraging girls to learn mathematics.*

*T<sub>3</sub> : The transfer of ideas from previous generation to modern generation has left bad image about mathematics. Those who failed in mathematics in society believe that mathematics is hard and can be done by boys only.*

By the response of maths teachers, it was concluded that there is still misconception that optional mathematics is hard for girl students. There is view and belief that

mathematics and related fields are more appropriate for boys than for girls. On the other hand, a specific obstacle is the prevalent bad image of optional mathematics and mathematician in society and community. Some people hate optional mathematics because it caused their failures or the failure of their students at school. Political, economics, religious and cultural condition of the society affect in the participation of girls in optional mathematics. The response of the interview of teacher and the result of opinionnaire scales were found in conformity. So it is concluded that the girl students' participation in optional mathematics is influenced by social variable.

## Chapter V

### SUMMARY, FINDINGS, CONCLUSION AND RECOMMENDATIONS

This chapter primarily deals with summary, findings, conclusion and recommendations. After the analysis and interpretation of the data, the following finding and recommendations have been presented.

#### **Summary of the Study**

The study entitled "**Factors Affecting Low Participation of Girls in Optional Mathematics**" aims to find out the factors that affect the low participation of girls in optional mathematics. In order to fulfill the objective of the study, I went through five different chapters. In first chapter, I have presented the introduction of the study that includes background of the study, objectives, research questions, significance of the study, delimitations of the study and operational definition of the key terms. In second chapter, I have discussed the review of the related literature which consists of the theoretical part of research. On the basis of the review of related literature, I have developed conceptual framework to conduct this study. The methods and procedures of the study have been described in third chapter. The design of this study was survey and data were collected by using both primary and secondary sources. I exploited questionnaire as the main tools for collecting data. In fourth chapter, I have analyzed and interpreted data descriptively using appropriate tables and pie-charts. And in last chapter, I have presented the conclusion of the study and recommendations on the basis of findings of the study. After the collection, analysis and interpretation of data and the discussion made on the summary of the findings, I found that the girls of both urban and rural area had low participation in mathematics classroom because of

different factors like their own attitude towards mathematics, parents' passive role and society's traditional view.

### **Findings of the Study**

From the analysis of the data, the following major findings were derived:

- ) Overall, It was found that the participation level of girls was very low in mathematics classroom.
- ) The participation level of urban and rural girls in optional mathematics was exceptionally different.
- ) It was found that the interest of learners, student as well as parents' expectation and their views and beliefs directly influenced on girls' participation.
- ) 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 at home had direct influence in the girls' participation in optional mathematics.
- ) The school environment such as physical facilities of school, the number of students, gender bias at school, teachers and peers' behaviours towards girl students affected the girls' participation in optional mathematics.
- ) Form the analysis, it was found that continuous practice, review and application of mathematical concepts affected the participation of girl students in optional mathematics.
- ) The girls who were encouraged by society to study mathematics exhibited better performance in optional mathematics, whereas those who were discouraged did not do well in optional mathematics. Thus, it can be concluded that the social variables such as social system, cultural customs,

traditional effects of gender directly influenced the participation of girl students in optional mathematics.

) Form analysis, it was also found that most of the girl students felt difficulty in reading, comprehending the overall meaning of optional mathematics and make mistake in solving the mathematical problem. Owing to this, they could not do better in optional mathematics.

## **Conclusion**

Mathematics is intimately involved in everyday life. Right from the commencement of human existence on this earth, the use of mathematics has been a part of human activity. It has practical values in human life. We can neither know things correctly nor get practical utility of calculation unless we have the knowledge of mathematics. It is the numerical and calculation part of human life. It helps man to give exact interpretation to his ideas and conclusion. Benjamin Pierce (1998, p. 6) expresses that "Mathematics is the science that draws necessary conclusion." According to Sidhu (1990, p. 42), "Mathematics is the numerical calculation related to human life and knowledge". It enables us to solve mathematical problems in our daily life, develop discipline through cultivating the habit of concentration and self-reliance, prepare for technical Service such as accounts, mathematics teaching, auditing, engineering, and reasoning. So we take mathematics as a way of thinking, means of communication and tools of reflexive thinking.

Mathematics has been taken as the science of all sciences and art of all arts. It is an essential part for the development of science and technology. Thus, mathematics like a language is a basic tool for communication of thoughts and ideas. it is an essential tool for everyday life. It also plays a vital role for the development of science

and technology. Math helps people to understand and interpret very important quantitative as well as qualitative aspects of natural phenomena.

The significance of mathematics has rigorously been accepted in Nepal. Different plans and commissions have outlined that, “A well granted understanding of mathematics is an essential part for everyday life as per higher study in the field of science and technology”. National Education System Plan (NESP, 2028) states the importance of mathematics in following words, “Mathematics like a language is a basic tool of communication. Daily translation and communication involve the frequent use of mathematical concepts.” Thus, it is a quite natural that mathematics has been given a very important, place i.e. second place in school education.

Mathematics is the language of logic. Being able to communicate a logical argument does depend on some maths fundamentals. It is a source of equality; it closes many educational and career opportunities to disadvantaged groups and female children. Maths is essential for every task, such as managing a credit card, buying groceries, playing games, computing the milage and so on. It is observed that the participation of female in mathematics class in Nepal is at critical stage in overall. Similarly, the participation of girl students in optional mathematics is significantly very low. Society as a whole believes 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 creates the belief that they are not capable of doing well in mathematics. So, they do not participate in ninth grade optional mathematics classroom.

Although mathematics education has been given an important place in curriculum of all level of school and the university education, most of the students fail in this subject. This latent factors impede 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 comprehend the mathematical ideas. However, this reason is not scientific because different researches have shown that girls are also equally capable to do maths as boys do. The reality lies in the fact that the attitude developed in the girls towards mathematics is major factor to discourage them from doing well in mathematics.

Overall, four factors were identified as influential variables for the participation of girl students in optional mathematics. Those four variables include: home environment, school environment, teaching learning process and social variable

Thus, it can be concluded that girls are equally talented and should be given equal opportunity at home and at school to learn optional mathematics. Parents and teachers should not consider boys as assertive and daughter as fragile and liability.

### **Recommendations**

After the analysis and interpretation of data, the following recommendations have been suggested on the light of the findings and conclusion of the research.

### **Recommendation for Policy Level**

A policy recommendation is simply written policy advice prepared for some group that has the authority to make decisions, whether that is a Cabinet, council, committee or other body. Policy recommendations are in many ways the chief product of the ongoing work of government managers to create and administer public policy. Policy recommendations have a lot in common with briefing notes. Like a briefing

note, a policy recommendation serves to inform senior decision-makers about a policy issue. However, a policy recommendation document goes further than a briefing note, providing both a more in-depth analysis of the options and a policy recommendation.

Policy recommendations are the key means through which policy decisions are made at most levels of government. In our federal and provincial governments, policy recommendations are brought forward by a minister or department for approval by Cabinet. Whether the policy recommendation is accepted as sound advice or dismissed in favour of another option largely depends on how well the issue and the arguments justifying the recommended course of action are presented.

A recommendation report should state facts rather than popular opinions. Additionally, a recommendation report should include a solution that is specific to the problem and takes into account chance and human nature. Also, it should be supported with research and devised after consideration of economic factors. By considering these factors and presenting a solution in the proper format, a recommendation report can be used to influence others.

Recommendation at policy level are as follows:

- i. This study would help at policy level to suggest strategies to decrease low participation of girl students.
- ii. To provide sufficient budget to construct and purchase mathematical teaching material.
- iii. To conduct special program encouraging girl students in mathematics.



- iv. To help curriculum developer to include timely amendments in the school level mathematics curriculum to decrease girl students low participation in mathematics.

### **Recommendation for Practice Level**

Practice level research refers to the recommendation which is made by the practitioner of that field. It is the recommendation which tries to translate the policy into practice. This type of recommendation is essential to be mentioned to bring the theory into reality. The main recommendations of the study at this level are as follows:

- i. This study would help to improve existing classroom teaching learning situation.
- ii. This study would help to increase class participation of girl students in mathematics.
- iii. This study would help to make parents and teacher aware of their role towards the girl students.

### **Recommendation for Further Study**

The conclusion of this study cannot be generalized to all schools students and to all areas 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 girl students are weak in mathematics and do not participate in optional mathematics. 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 Bara 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-II

### Guidelines for Interview with Secondary Math Teacher

Date of interview:- .....

Name of teacher: -..... Ethnicity:-.....

Qualification: -..... Religions:-.....

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 mathematics
- ) Home environment
- ) School environment
- ) Social variables and girls achievement
- ) Study time

### Interview questions for Teachers

1. How about the participation of your students in mathematics subject? Why?
2. What is the factor that affects girls' participation in mathematics ?
3. Do you think that the parents at home affect the girl's participation in mathematics? Yes or No. Mention those factors.
4. What do you think about the girl students interest in reading mathematics?
5. How do social variable affect the participation of girl students in mathematics?

6. How does school environment affect the participation of girls in classroom?
7. Is there any discrimination between boys and girls in your class?
8. In your opinion do you think the other probable factors could also effect the girls' participation in mathematics?

**Appendix III**  
**Weightage Mean of the Students**

Rural girl students					Urban girl students				
S.N.	A	U	D	Weighted mean	S.N.	A	U	D	Weighted mean
1	35	7	18	2.28	1	34	6	30	2.23
2	33	20	17	1.73	2	25	7	8	1.88
3	29	9	22	2.11	3	28	6	26	2.02
4	19	5	36	1.71	4	39	10	11	2.46
5	20	5	35	1.75	5	30	3	27	2.05
6	8	3	49	1.31	6	32	4	24	2.13
7	41	4	15	2.43	7	40	7	13	2.41
8	9	7	50	1.31	8	46	3	11	2.58
9	24	8	14	1.56	9	12	6	42	1.5
10	36	3	28	2.6	10	9	4	39	2.23
11	11	5	19	2.28	11	38	4	16	2.40
12	21	5	34	1.36	12	25	2	33	1.12
13	34	1	25	2.14	13	34	3	23	2.6
14	19	2	29	1.16	14	22	3	35	1.86
15	14	2	34	1.06	15	25	1	34	1.67
16	33	4	23	2	16	21	3	36	1.67
17	36	6	18	2.46	17	26	0	34	1.58
18	40	4	16	2.09	18	19	2	37	1.2
19	18	6	36	1.9	19	35	4	21	2.4
20	43	7	11	2.67	20	32	5	24	2.13
21	32	3	25	2.4	21	27	3	30	1.68
22	31	2	27	2.43	22	26	4	30	1.54
23	29	3	28	2.09	23	20	3	37	1.3
24	21	3	26	1.8	24	33	4	23	2.6
25	29	3	28	2.64	25	36	3	21	2.10
26	11	7	42	2.51	26	15	7	89	2.43
27	24	5	31	2.11	27	51	2	7	1.2
28	45	2	11	1.36	28	50	4	6	2.26
29	9	5	46	2.61	29	25	3	32	2.11
30	25	3	32	2.11	30	41	3	15	1.53



## Appendix I

### Questionnaire for Students

S.N.	Items	A	U	D	Student related
1	I take mathematics as a hard subject				
2	I have no basic knowledge in mathematics				
3	I feel very difficult to ask questions with teachers				
4	I always complete homework given by teachers				
5	I study mathematics when I am free				
6	I feel difficulty in reading key words and symbols				
7	I feel hard to comprehend the overall meaning of mathematical problem				
8	I also learn mathematics from my friends				
9	Teacher's role in mathematics class is as a facilitator				Teacher related
10	Teachers do not make class interesting				
11	They use teaching material in classroom				
12	Teachers focus on boys more than the girl				
13	They discuss on pre concept related to the exercise before beginning the lesson.				
14	Teachers make problem clear				
15	They take unit test at the end of each unit				

16	Our school does not manage special class for girls				School related
17	There is a lack of proper attention on the students' problems				
18	School does not create congenial environment for girls				
19	There is a lack of students friendly class.				
20	School lacks of female teachers in school.				
21	Our parents do not manage all the required materials for the study of mathematics				Home related
22	They treat unequally son and daughter				
23	Our parents do not discuss about my learning progress report with math teacher				
24	They manage tuition and coaching if necessary.				
25	Learning environment is not better at home.				
26	Females have inferior place in society				Society related
27	Girls do not get opportunity in society				
28	Society has no idea whether the subject matter of mathematics is good or bad				
29	Society does not admire girls who studies mathematics				
30	The society does not inspire to learn mathematics				