

## **Chapter - I**

### **INTRODUCTION**

#### **Chapter Overview**

This chapter begins with its introductory part, highlighting the background of study, problems of the statement, objectives of the study, significance of the study delimitation of the study, and definition of the related terms.

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

Mathematics directly deals with human life. It is believed that the development of mathematics and development of human civilization go together. Mathematics was created to fulfill the human needs. Through mathematics was introduced later in the education system, it has been developed simultaneously with the development of society. Mathematics is not only taught and practiced through the formal institution, the contemporary societies have been practicing it with own ideas and belief system.

Historically, literature shows that mathematics originated from practical experiences. It was used in which building bricks, house, gutter, bridges, temples, pyramids, different handicrafts, and planned cities. This is found from the evidence of Babylonia and Egypt civilization at around 3000 BC to 200 A.D. to you and to me for its method content as well as characterized by order and internal consistency. It is queen of all sciences. Elementary mathematics including ancient in most ancient civilization including ancient Greek, the Roman empire, Vedic society and ancient Egypt. In most cases, a formal education was only available to male children with a sufficiently high status wealth or caste (Hann, 1961).

Mathematics developed from society. The history of mathematics education reflects that the contemporary society has served today's situation in

the field of mathematics. It was developed to fulfill the necessities of the society. Mathematics is developed in different societies in their own means and ways for their requirements (Best and Khan, 1999). Basically it is very much older which begins in 11<sup>th</sup> century as well known as for the first mathematician of any note was a Greek named zero. Zero of Elea is memorable for arguments like racecourse (Stephen and Sue, 2001).

Mathematics and mathematics education are two separate disciplines in the field of education. Mathematics primarily focuses on the process and product of what mathematics does. The focus of mathematics is on creating mathematics with understanding its basic structure. It does not give much concern on how mathematics should be taught, what mathematics should be taught, who can learn mathematics and why one can't learn mathematics like issues. Mathematics education deals with mathematics from perspective of education. It is concerned with the development and implementation of appropriate mathematics curriculum and with all issues associated with the teaching and learning of mathematics. In keeping with concept of lifelong learning, mathematics education covers learners of all ages and at all levels from early childhood to adult. Thus, mathematics education is not solely concerned with curricula, classrooms, teachers and learner in school, nevertheless, issues associated with school mathematics will major focus. The area of mathematics education are curriculum, teaching, learning and evaluation. Five foundations philosophies, psychology, sociology, mathematics and technology guide these three areas. Hence mathematics education is applied discipline that deals with the wider application of mathematics in different sector and fields. Mathematics carrying full marks 100 along with optional mathematics 100 marks in both private and public school in secondary level.

The word "mathematics" itself derives from the ancient Greek  $\mu\alpha\theta\eta\mu\alpha\tau\iota\kappa\acute{\alpha}$  (*mathema*), meaning "subject of instruction", that means "to learn". Therefore, mathematics is the process of learning and it is an expression of human mind,

concerned chiefly with idea, process and reasoning. Mathematics is the collection of experience of many previous thinkers. Therefore, it has a long history. Different thinkers and philosophers developed mathematics as a discipline for developing rules, formulae and system based on solving their social problems throughout the continuities of the civilization and social life. Mathematics is the necessity of the civilization. It has been originated with the raise of the human beings.

Mathematics has been accepted as an important component of formal education from ancient period to till now. History shows us that ancient people developed mathematics practically being obliged to solve day to day problem. Later on advanced form of the mathematics structure, rules, formula, theories have been developed and used on solving social problems through empirical observation and experiences. Now a day, every human discipline is interpreted in mathematical model. Therefore, there is crucial role of mathematics to the everybody's daily life and also for the base of further studies. Early mathematics required a practical basis for its development and such a basis arose with the evolution of more advanced form of society. It was along some great rivers of Africa and Asia, that the new form of society made their appearance. Thus, early mathematics can be said to have originated in certain areas of agricultural and engineering pursuits.

Nowadays, more of the students seeking admission in the previous fields of science and technology is increasing every year. Most of the educated parents in Nepal want their son and daughter study science and mathematics. They not only inspire but also compel their children to study these subjects. In effect most of time they get adverse result due to their children's interest, aptitude, attitude, ability and intelligence. They are even not capable to find whether their children have a favorable attitude for the study of the particular subject (mathematics) or not. As a result, there is a huge failure rate in mathematics subject. Therefore, it becomes essential before giving admission to student in any specified branch of the subjects to investigate the attitude and

capability of the students. Through Hemanta Joshi (1997) has identified some significant factors, which influence achievement status of students in mathematics, his study was confined to grade X. The factor, which affect achievement level of students of any grades in mathematics, are changeable in time and space. So achievement itself requires further analysis after the certain interval of time. In order to suggest measures for enhancing achievement level of secondary level students in mathematics first the factors affecting it needs to be identified. Relevant to this context, the present research was under taken to make a thorough assessment of achievement level of secondary level students and also identify the factors that determine the level of achievement among those students. In fact, such types of studies are necessary in order to make education better and fruitful.

Before the development mathematics education there were no trained teachers, teacher use to teach teacher's centered method without using teaching materials and there were no appropriate textbook but after the development of mathematics education there are trained teacher in school and they use student centered method by using appropriate teaching materials. Syllabus is also designed according to need and demand of society. Due to development of mathematics education it affects positive attitude in the school. Mathematics education effect in private school better than public school because the achievement in mathematics is better than in public school. There may be different reasons behind it such as physical facilities, lack of textbook, lack of teaching materials, large size of class which are school related factor as well as parent's participation, home environment, parents education etc. Therefore, I am motivated to explore the factors affecting learning mathematics in school level.

### **Statement of the Problem**

It has been depicted in various achievement researchers that student achievement in mathematics in Nepal is relatively low and unsatisfactory. There is a deeper relation between achievement and learning variables. As

mathematics is emphasized like language, most of students feel it as a difficult subject and some of students fail in optional mathematics in SLC examination. By this problem the great deal of time, money effort and manpower of the nation have been wasted. And it seems that it is affected by various factors like home and school environment, physical facilities, attitudes towards the subject, peer groups, teaching learning process, equipment etc. We cannot achieve the expected goal without improving appropriately the management of above mentioned factors of facilitates the students learning.

Regarding this many students feel to learn the optional mathematics is very difficult task. That is why, the result of SLC in 2070 was not so good in public schools. The private schools have been some how successful in effective teaching learning activities and getting good result of their students in SLC examination with higher scores. Even though the result of SLC in 2070 was not so good on both private and public schools. It is due to the case of learning process. There may be some factors which affect the learning process of students. So I wanted to seek the factors affecting learning in optional mathematics. There was no investigation on factors affecting on learning in optional mathematics. I sought the answer of the following specific questions :

- ) What components affect the learning optional mathematics ?
- ) What types of strategies could be adopted by the school for low learned students to improve their learning ?
- ) How can the low performer students in optional mathematics be promoted ?

### **Objectives of the study**

- ) To identify and analyze school related factors and out of school factor that affect learning in mathematics of students.
- ) To identify the strategies taken by the school administration in improving mathematics learning.

## **Significance of the Study**

As far as possible, researcher will be great endeavor to assemble his real experience, feeling and thought. As his belief and great effort on this study, researcher hopes that his finding will be fruitful for me as well as also productive for others. This study is helpful to the students who are teaching optional mathematics. Those teachers who are novice in teaching career they may take benefit from this study. This study will be helpful for the author of optional mathematic who will write text of optional mathematics. Also it will be beneficial how the optional mathematical content will be associated in the curriculum. It will be fruitful for the stakeholder and agencies to step further. In short, following are the significance of the study.

1. It would contribute to find the way to decrease the failure rate of the students.
2. It would help to guide the instruction on the basis of the individual difference.
3. It would help the curriculum planners, textbook writer, police maker equally.
4. It would help the government to adopt globally for the education level.
5. It would beneficial to the math teacher and parents.

## **Delimitation of the Study**

The delimitation of the study are as follows :

- ) This study is limited to the public and private secondary school appearing in S.L.C. examination 2070 B.S. from Chitwan district.
- ) It is limited to optional mathematics.
- ) The study is based on qualitative analysis.
- ) This study is limited only the responses of head teacher, mathematics teacher, parents and students.

## **Definition of the Related Term**

Class structure : It means number of those students who studying in the class larger class structure less effective than small class structure.

Quantity of class activity: It refers those activities which is done by students during the period of mathematics class. Mathematics achievement get more and more based on quantity of class activity.

Peer's behaviors: It is related to the behavior among student about mathematical problem and way of solutions. It helps to exchange their knowledge.

Private school: All the nongovernmental school in Nepal

Public school : All the government school in Nepal

S.L.C. : Student who have completed their study in secondary level, have to pass this more precisely, the secondary level examination which is conducted annually by ministry of education, office of the controller of examination. (Education Information of Nepal, 2000)

Class size : number of students in mathematics class.

## **Chapter- II**

### **REVIEW OF RELATED LITERATURE**

#### **Chapter Overview**

This chapter begins with its empirical review, theoretical construction, theoretical understanding, and conceptual framework. Research in any sector of skill wants a suitable studied with the works in which there many have many research been done in the same area. We get deep knowledge from research which must have already developed theories and researches which is approximately connected with the problem chosen by him or her. From review of literature we became identify of what has been established, known or studied and what has not been try to be found yet. It also provides knowledge find out the difference in research for further study. The purpose of review literature is to spread upon the text and background of the study. There are so many books, report and related studies have been reviewed in order to explain the present problem of the study.

#### **Empirical Review**

Pant (1978) did an experimental research work on "Effectiveness of the-use of unit test results in enhancing pupil achievement in mathematics" with the objectives to find out he effectiveness of unit test as a teaching tool for enhancing achievement in mathematics at the seventh grade level of a secondary school in Kathmandu Town Panchayat. He selected eight students from one school by systematic sampling and taught eight units from textbook. Unit test were given at the end of each unit in experimental group. A comprehensive test has given the multiple choices, completion items. He found that the achievement of two groups differed significantly.

Raliman (1981) did his thesis for Master's Degree on "Achievement in mathematics by sex: A study of sex differences in achievement in mathematics



of seventh grade students in selected schools of Kathmandu Nagar Panchayat Area with the objectives to investigate whether sex influenced the achievement in mathematics. Achievement test (Knowledge, Skill, Comprehension and Application) in Arithmetic, Algebra, and Geometry was prepared and administered in five schools. The t-test was applied to conclude that the superiority of the boys over the girls with respect to achievement in mathematics as a school subject with regard to achievement in mathematics by area and also cognitive levels.

Ghimire (1997), studied on "A Study on Factors Affecting Teaching/Learning Mathematics at Secondary Level" with the objective to study the factors affecting in learning of schools in terms of school environment, family background, motivational factors, physical facilities, interest of the learners, instructional materials. The tools for the study were administered to the sample of ninety students and t-test was applied to conclude the result that; Home environment affects the subjects on rural areas and girls were affected more than boys. The students of Kathmandu were more motivated to study mathematics than that of Arghakhachi and Chitwan.

Guragai (2001) did research on "A study of achievement in mathematics of primary level students of Morang and Dhankuta districts" with the objectives to compare the achievement in mathematics of primary level students between Morang and Dhankuta districts resembling Terai and Hilly region of Koshi Zone. Researcher developed an achievement test from the prescribed curriculum of grade V. Four hundred students from twenty four schools were selected. Z-test was applied to conclude that Morang district surpassed Dhankuta district students in every aspect male, female, rural and urban.

Pant (2001) did a research work on "A study of achievement in mathematics at primary level in Doti district" with the aim to study the achievement level in mathematics of grade V students as a whole, by gender and location. Mathematics Achievement Test was prepared by the investor and

administered on two hundred students, in six-government school. He concluded that the achievement level of fifth grade students in mathematics o Doti district was 44.16% and there were significant difference in the achievement among the rural schools' students and urban schools' students in mathematics.

Neupane (2001) did his experimental research on "A Study on the Effectiveness of Play Method in Mathematics Teaching at Primary Level." His study intended to answer the question whether the performance of the pupils of primary level taught by play-way method affects on the mathematics achievement as compared to traditional method. He collected the data through pre test and post-test in class one on addition and subtraction. Two equivalent groups were established on the basis of pre test results and randomization. Researcher taught in experimental and control group at the duration of one week and took post-test to both groups in some way. The data was analyzed and interpreted statically with t-test and discovered that experimental group achieved better performance than the control group. Hence his finding is that the achievement of students taught by play way method was significantly different than the achievement of the students taught by traditional method.

Poudel (2001) did a research work on "A study on the effectiveness of class work while teaching geometry at the secondary level" with aim to investigate if the class work turn to be effective while teaching geometry. The research conducted experimental studies. The researcher taught geometry to both the groups (experimental and control). The experimental group was taught the units class works entwined with the regular classroom whereas the control group was kept detached as far as possible classroom work activities. An achievement test was given. The t-test was used to conclude that experimental group did better than control group.

Sapkota (2005), studied on 'A Comparative Study of the Mathematics Achievement on SLC Result of Kathmandu and Kavre District of Nepal.' The major findings of the study in several variables are presented as follows: There

is signs scant difference between the achievement in mathematics students of Kathmandu and Kavre district. There is significant difference between the achievement of boys and girls in mathematics of Kathmandu district. There is significant difference between the achievement of the students from rural and urban area of Kathmandu district.

Subedi (2005), studied on "Factors Affecting Failure in Mathematics in SLC examination". The major findings of the study are given below:

The variable school environment has strongly positive effect on the failure's mathematics achievement. The variables effective classroom teaching and time variable have a mid positive effect on the mathematics achievement. The physical interest of the learner has low positive effect on mathematics achievement.

Nath (2007), did a study on a topic "A Study of Causes of Failure in Optional Mathematics in SLC Examination". The main findings of this study fir as follow, which are the causes of being failure. Text books are more theoretical. Lack of teaching materials in teaching activities. Teaching without familiar with students' previous knowledge.

Giri (2008) "A critical analysis of SLC Compulsory Mathematics scores 2063." Intending well educational out comes the state has finance large amount of money as well as guardian also have invented their children education, but result of SLC is still poor. Mathematics is being the major causes to make students failure. There is a saying that the course content, the way of managing circumstances, evaluation system all are within the favor advantages group, which always ignore the marginalize and deprived group. Almost all research finding have shown that there is not a unique determination, with affects students' achievement. Factors or variable such as students' gender, as parents' education, occupation, location of school, students' religion, eco-status, teaching skill, environment, class size, medium of instruction are supposed to be the most influencing factors in mathematics achievement. This study was

carried out with the view of finding among all variable state about which variable is most influencing.

Yadav (2008) did a survey type research work on "Causes of low achievement mathematics" with the objectives are to analyze the mathematics achievement of Musahar students, to find the mathematics learning environment of Musahar students at school and home, to find the causes of low achievement of Musahar students at primary level.

Sharma (2001) did a research on "A study on the attitude of teachers' guide of mathematics for grade X" with a view to find out the attitudes of mathematics teachers about teachers' guide and to compare the attitudes of public and private schools mathematics teachers and to compare the attitudes of mathematics teachers from rural and urban area. He selected forty teachers by stratified random sampling from Kathmandu district. He prepared questionnaire of fifty statements twenty-five positive and twenty-five negative. He used chi-square, t-test, f-test to conclude that the teachers teaching in grade X have negative attitude towards teachers' guide of compulsory mathematics of grade X and no difference was found between the public and private school teachers towards teachers' guide.

Yadav (2001) did a survey type research carried out on topic "A study on the effectiveness of the primary school teachers of the district of Sirha" with the objectives to explore the extent of effectiveness parameters in determining the effectiveness of primary school teachers and to compare the effectiveness of rural and urban primary school teachers. Twenty-eight teachers (twenty-two trained six semi-trained teachers) were as a sample. A questionnaire was prepared to solicit the opinions of the teachers. A classroom observation form was also developed to record the classroom situation and activities. U-test and z-test were applied to conduct that teachers were found to be effective. The effectiveness of urban teachers was not found to be significantly different from those of rural teachers.

Shrestha (2002) did research work depending upon the secondary data of the result of SLC examination on "A study of mathematics achievement of private and regular students in SLC examination." With the aims to identify the trend in mathematics achievement of the students attempting the SLC examination privately and regularly and to compare the overall mathematics achievement of private and regular students. Data were collected from Lalitpur district of the five years 2054 BS to 2058 BS. The t-test was applied to conclude that the trends in achievement of private and regular students in Lalitpur district in terms of mean scores were decreasing in both the cases in similar manner. The study concluded that mathematics achievement of the private and regular students did not differ in the examinations.

Parajuli (2011) has studied entitled "Causes of failure in mathematics in S.L.C. examination in community school (A case study of Dhankuta district). In his study he found school related factors are peer group, class structure, school presentation, amount of homework and out of school related factors are parent's participation, curiosity of learner, time schedule, father's education affects the student's mathematics achievement by using one way Anova at the significance level  $\alpha = 0.05$  with the objective what are the causes of failure in mathematics in S.L.C. exam, to what extent school related factors such as peer group, class structure, amount the homework affects the student's achievement. The tools for the study were administered to the sample of 100 students. The population of his study students failure in mathematics in SLC examination of 2066 B.S. one way Anova was applied to conclude the following result:

- ) There was favorable opinion in parents in academic learning
- ) There was significantly different in children in mathematics achievement on basis of parents involvement.
- ) There was significantly difference in children mathematics achievement of non involved parents.

CERID did a national work shop (12 - 16 January, 1987) and found the following factor play great role on achievement in raising the performance level in primary education such as teaching strategies parental support and school management. The student who completed secondary school can achieve differently in private and public S.L.C. examination but what is influencing factor in private and public S.L.C. examination ? What is the significance of influencing factor in mathematics examination ? These are interesting question so researcher will wanted to be comparing the mathematics achievement of private and public school's student achievement.

Pokhrel (2001) had studied entitled, "mathematics achievement in school leaving certificate examination between public and private school student at Kaski district." The main conclusion of this study was to mean achievement scores and correlation of private school student in compulsory and optional mathematics was greater than public school student in Kaski district in S.L.C. examination he concluded that the mathematics achievement of private school is better than public school Richard (1983) had made study titled "Factors related to student's school achievement." He concluded the important factors related to students school achievement in mathematics are classroom behavior (time spend in learning, student attention, method of teaching

Teachers background (trained, experience ability) of private & public school student's characteristics (prerequisite knowledge student attitude daily attendance)

Baral (2011) has studied entitled "Causes of failure mathematics in SLC examination (A case study of school in Bharatpur)." In his study he found school related factors are associated with school environment, physical facilities, teacher's behavior, peer's behavior, manageable library, classroom environment, regularity of teacher and student, instructional teaching materials etc. and out of school related factors are associated with family background, interest of learner towards mathematics, amount of time student spent on

school activities such as leisure reading, homework, discussion with peers economic condition, motivation etc. affect mathematics achievement through qualitative as well as descriptive research. With the objective to explore the main cause of failure in mathematics in SLC examination and to suggest the main causes of bring improvement in result by finding the improvement programme that can be carried out in school level. The population of his study students failure in mathematics in SLC examination of 2066 B.S. in public school of Chitwan district. The tools for the study were administered to the sample of eighty students of eight school in which forty boys and forty girls from the population of the student failure in mathematics in SLC exam which concluded the following result :

- ) The student were found to be indifferent in study because the same teacher who taught more than two subjects (i.e. comp. mathematics, science, opt. maths)
- ) The mathematics teacher was enable to address for varied cognitive level's students in class room while teaching.
- ) The school was trying to reduce problem of mathematics failure by managing extra classes in the evening

Tuncay Saritas and Akdemir study (2009) indicated the studies are affected by various factor. In their study they found school related factors are curriculum, instructional strategies and methods, teacher competency in math education, motivation or concentration method, participation instrument procedure analysis, self directed learning, arithmetic ability and out of school related factors are associated with gender, socio-economic status, parents educational level. They concluded purpose of the study as follows:

1. How much to mathematics department students think demographic factors, including gender, parents' educational level and socio-economic status, influence their achievement in mathematics ?

2. How much do mathematics department students think instructional factors including curriculum, instructional strategies and methods, teacher competency in math education, and school context and facilities influence mathematics achievement ?
3. How much do mathematics department students think individual factors including self-directed learning, arithmetic ability, and motivation or concentration influence mathematics achievement ?
4. What are the three most influential factors on the mathematics achievement of students ?

The finding of their study reported that instructional design of a mathematics course is important and should be compatible to the factors identified for mathematics achievement. Educators need to adapt and create alternative innovative learning and teaching strategies for effective mathematics education. The findings also suggest that different instructional design strategies should be studied and applied in different contexts.

## **Conclusion**

Above literature mainly focused on the causes of failure and low rate of achievement. In the past decades it was practiced researching about the causes of failure of students in mathematics. To improve the learning not only finding causes of failure and low achievement but here needs to find affecting factors of learning mathematics. So I was interested to find the affecting factors of learning. Still the researcher is unable to address the factors affecting mathematics at secondary level. The previous researcher had addressed only comparison of public school's and private school's marks result. By comparing that the researcher have shown better result of private school in the comparison of public schools. It was found that there is gap between causes of failure and low learning. Thus, to fulfill this gap, this research had been conducted.



## **Theoretical Construction**

In the section, the researcher introduced the theoretical discussion which is relevant for the interpretation of the findings of the study. There are various learning theories related to children's learning and development. Some of them are classical conditioning, operant conditioning, trial and error, social learning, social development, constructivism, cognitive learning, socio-cultural, multiple intelligence and so on.

From a contemporary constructivist perspective of mathematics education, personal experiences and previously learned knowledge and skills are, encouraged as components for understanding. Observations, hypothesis and conclusions are made, tested and drawn within a social environment that allows sense to be made. Unreasonable or meaningless mathematical solution would be medical by cultural knowledge, and skills acquired in class could be used in real contexts. Increased understanding should result from mathematical tasks being linked to personal student experiences, and form the incorporation of the linguistic and culturally of students' lives.

Basically, constructivism views that knowledge is not 'about' the world, but rather constitutive of the world. Knowledge is not fixed object, it is constructed by an individual through his/her own experience. This theory of learning acknowledges that individual is active agents, they engage in their own knowledge construction by integrating new information into a meaningful way. Constructivist argue that it is impractical for teachers to make all the current decisions and dump the information to students without cling students in the decision process and accessing students abilities to construct knowledge.

The constructivist approach to mathematics learning is argued to lead understanding of mathematics when applied to the physical, social and cultural experiences and developmental contexts of the learner whereas traditional mathematics' use of highly structured worksheets, step-wise rulers practice examples, and formulaic solutions to word-problems has been criticized for its

poor survival of understanding and application beyond the classroom. Conditions of classroom that foster a constructivist approach involve the use of realistic problems and conditions and the use of multiple perspectives, active engagement, group participation, frequent interaction and feedback, contexts that connect learning to real world, and integration of assessment into instruction.

Social constructivism is focused much on learning through cooperative group learning. It emphasizes the importance of culture and context in understanding what occurs in society and constructing knowledge based on this understanding. Social constructivism is based on specific assumptions about reality, knowledge and learning. To understand and apply models of instruction that are rooted in the perspectives of social constructivists, it is important to know the premises that underlie them. Social constructivists believe that reality is constructed through human activity. Member of society together invent the properties of the world. For the social constructivist, reality cannot be discovered that; it doesn't exist prior to its social invention.

### **Theoretical Understanding**

There are many learning theories which can be used for the analysis and interpretation of data such as classical conditioning, operant conditioning and trial and error theory and so on.

Walberg Model (1981) has defined learning as a function personal variables and instructional treatment. Learning and performance of learned behaviors are influenced by several factors. Walberg describes a theory of educational productivity requiring optimization model, which mentions nine factors to influence achievement of cognitive and effective outcomes. This model includes a paradigm connecting aptitude (ability or prior achievement, motivation or self concept and age), instruction (quantity of instruction and quality of the instruction) and environment (home environment, the classroom

or school environment, the peer group environment and the mass media) as inputs to learning (effective, behavioral and cognitive).

Walberg (1981) proposed a theory of educational productivity which has theoretical foundation of Lewin (1963), formulation of behavior as a function of personality and environment. Walerg's theory requires optimization of nine factors to increase student's achievement of cognitive and affective outcomes. The nine productive factors the students related variables

- a) Ability or prior achievement
- b) Age
- c) Motivation of self-concept; the instructional variables
- d) Quantity of instructions
- e) Quality of instructional experiences; and educationally stimulated psychological aspects
- f) Home environment
- g) Classroom or school environment
- h) The peer group environment
- i) The mass media (especially television)

These factors were classified into three general groups by Wilkins et al (2002) :

- a) Personal variables, such as prior achievement, age and motivation of self-concept
- b) Instructional variables, such as amount or instruction, and
- c) Environmental variables related to the home, teacher, classroom, peers and media exposure

### **Carroll Model (1982)**

This model mentions that students achievement depends on the degree of learning. It is a function of the ratio of tasks to the total amount of time

assigned. In the learning model, Carroll describe students achievement, which is affected by five factors.

**1. Institute for particular kind of learning**

According to carol, aptitude is the amount of time required by a learner to attain mastery of a given learning tasks.

**2. Quality of instruction**

This should be considered in terms its effect on individual learns rather than on groups of learners.

**3. Ability to understand instructions**

This is largely determined by verbal ability and reading comprehension. To meet students need's instruction must be modified.

**4. Perseverance**

Students, vary tremendously in the amount of perseverance, they bring to a specific learning task. Perseverance can be increased.

**5. Time allowed for learning**

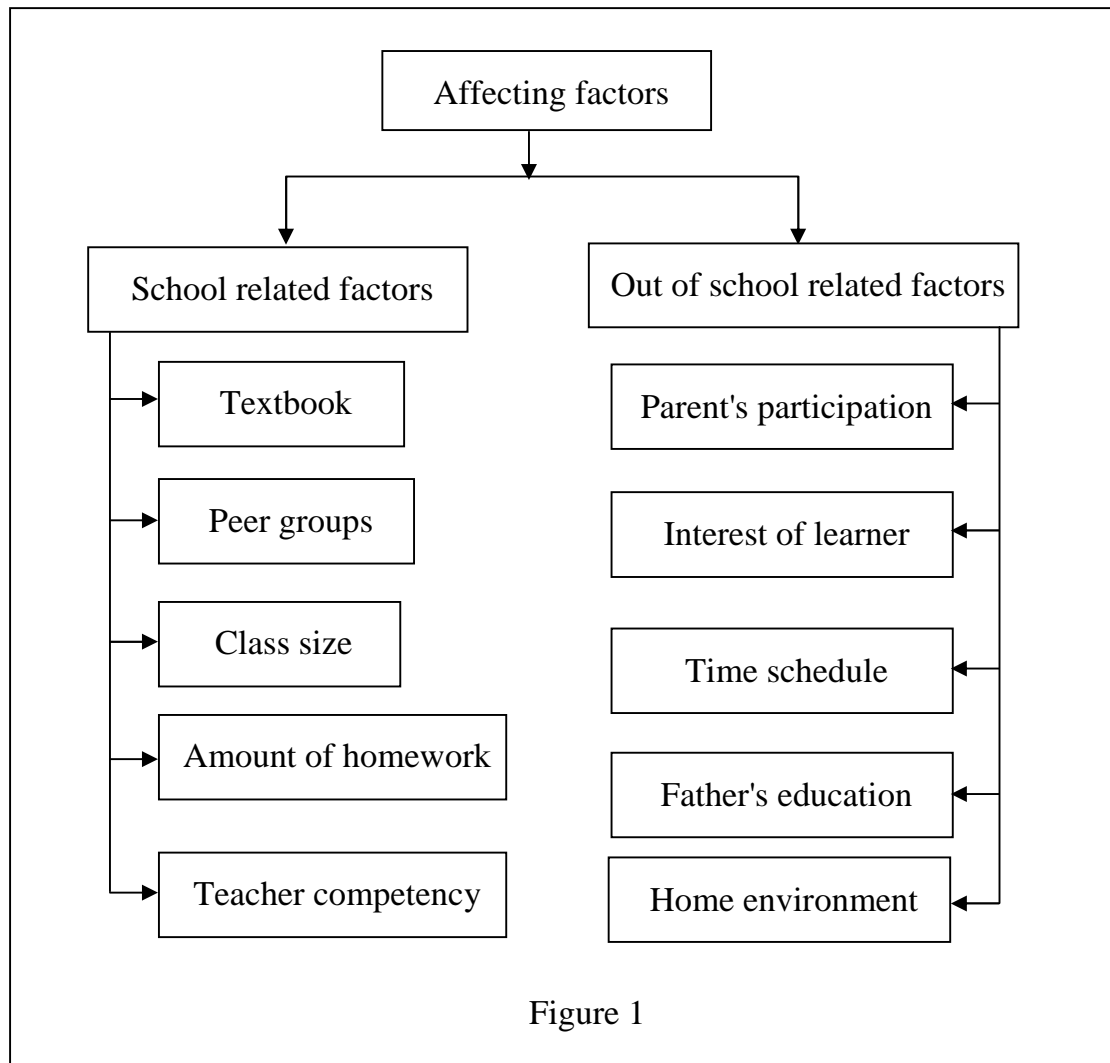
This the key to mastery. Amount of time provided for traditional courses is too much for some and too little for others.

**Bigg's Model (1985)**

This model mentions that student achievement is influenced by students' personal and situational factors. It directly influences students performance. Students learn by three types of processes- deep achieving and surface. It is also influences students performance in a given subject. Student's ability and personality also affect achievement process. The personal factor are affected by ability, prior knowledge, personality and home background of a students. The situation factors also remain influential in student achievement. The course

structure, instructional methods, time assigned to perform the task and task demand are the relevant situational factors.

### Conceptual Framework



Source: Walberg (1981) Wilkins et al (2002)

From the above table, it is found that there are many sort of factors which affect in mathematics learning. Mainly it is categorized into two factors as school related and out of school related factors. In the school related factors basically there are five crucial factors that is text book, peer group, class size, amount of homework and teacher competency. On the other hand there are five school related factors which are parents participation, interest of learner ,time schedule, fathers education and home environment.

## **Chapter - III**

### **METHODS AND PROCEDURES**

#### **Chapter Overview**

This chapter begins with its design of the study, population of the study, sample and sampling strategy, study area/field, data collection tools and techniques, data collection procedure and data analysis procedure.

Qualitative research takes an interpretative, naturalist approach to its subject matter, qualitative researchers study things in their natural setting, attempting to make sense of, or interpret, phenomena, in terms of meaning that people bring to them, so, I chose this methodology. The chapter explained the plan and method of study which helped to achieve the objectives of the study.

#### **Design of the Study**

Research design is a plan and strategy of investigation concerned so as to obtain answer to the research questions. The research design is the detailed plan of the investigation. In fact, it is the blueprint of the investigation. In other words, it is the blueprint of the detailed procedures of analyzing the obtained data (Singh, 2008, p.450). The learning in optional mathematics, which is directly or indirectly related to the school and out of school factors. The study is designed to determine the factors affecting learning of optional mathematics in private and public schools. Later, it is qualitative to describe findings. I used, interview schedule. The design of research is authentic by qualitative approach.

#### **Population of the Study**

Every research needs the population. Without population research can not be conducted. It has the crucial role. So the researcher made the population where studied. The population of the study consisted SLC graded students of Chitwan district on academic year 2070 B.S.

## **Sample and Sampling Strategy**

First of all the list of secondary school prepared from the list maintained by the district education office. There are 105 secondary schools in Chitwan district, according to district education office in Chitwan. But I took all together 2 schools, 1 from public and 1 from private selected by convenience sampling. Four students were taken from each school. Two guardians, two head-teacher and two mathematics teacher from each school.

## **Study Area/Field**

Every study needs study area, I chose 4 secondary schools of Chitwan district. It included International English Model School, Bhandara Higher Secondary School bhandara chitwan.

## **Data Collection Tools and Techniques**

The study intended to find the affecting factors behind the optional mathematics learning in governmental and non-governmental school in S.L.C. graded students. For this ,I used the following instrument to gather the data.

**Interview Schedule:** The interview is one of the major sources of data collection, and it is also one of the most difficult ones to get right. In qualitative research the interview is a form of discourse. According to Mischler (1986) its particular features reflect the distinctive structure and aims of interviewing, namely, that it is discourse shaped and organized by asking and answering questions. An interview is a joint product of what interviewees and interviewers talk about together and how they talk with each other. The record of an interview that we researchers make and then use in our work of analysis and interpretation is a representation of that talk. Two types of interviews are used in qualitative research in-depth interview and group interview.

In-depth interview is used basically in qualitative study design. With the same respondents several interviews are taken in different times. The term in-

depth it suggests that one after another interview, new themes, perspectives or issues are explored and these newly generated themes/issues are followed in the next interview. So in-depth interview attempts to draw very inner meaning of phenomena from the perspective of the respondents. It is taken periodically in different settings, and different circumstances of the respondents but the settings all the time in natural. It is administered to know head-teachers, mathematics teacher, parents and students view about the factors affect learning optional mathematics.

### **Data Collection Procedure**

Firstly for the purpose of the study, I visited all selected school of Chitwan district. For the research interview conducted to parents, head teachers, teachers and students to collect required facts. I organized interview schedule in which parents, teachers, students and guardians for the teachers knowledge in subject matter. Parents role discussed with parent and subject teacher.

### **Data Analysis Procedure**

This is real processing phase in analyzing qualitative data. The collected data in qualitative research is not of structured form and it is time the research has to do a lot in making workable structure of the collected information so as to make the meaning or theory. The collected information from interview schedule were taken from them considered as code and similar code version of the respondents collected and explained. Hence, the various themes were generated and using triangulation of field, literature, and my experience interpretation and analysis of data were done.



## Chapter - IV

### ANALYSIS AND INTERPRETATION OF DATA

#### Chapter Overview

This chapter deals with analysis and interpretation of the collected information. The researcher visited the school, parents and students. Researcher takes the responses of the respondent during the face to face interview were carefully noted. There was no limitation to responses for respondents. They were able to express freely whatever they have in their mind. To analyze the data, first collected information categorized according to different themes given in the text of interview. The observation note and themes were considered as code and the similar code version of the respondents were collected and explained in their perspectives. Moreover, the respondents of this school were selected, 2 school of Chitwan district, 1 from public and 1 from private.

There are 105 secondary schools in Chitwan district according to district education office in Chitwan. Bhandara Higher Secondary School and International English Model School were selected for the study of the factors affecting learning in mathematics. Both school lie in the middle of the Chitwan district. The surrounding places of the school's area also have such types of diversities.

The Brahmin, Chhetri, Tamang, Magar, Chaudhary, Dalit etc. are the local residents of this area. Mostly, the parents of the students are engaged in agriculture as well as labour. Economically, some people of this area are weak, some even have difficulty to join land and mouth. Initially, at the time of beginning, Bhandara Higher Secondary School had a small building but now the school has an 'L-Shaped' building and another trust building. And other private school, International English Model School has only trust building, which is in shaped of 'L'. Both school have 1 office room, 1 staff room, 1 science lab including small library, 15 classroom, 1 store room, two toilet

separated for boys and girls. Both are compounded by stone as well as break wall. Both school have ground for playing volleyball, football and programmel stage.

There are 22 teachers and 360 students in International English Model School in which 160 boys and 200 girls. Similarly, there are 31 teachers and 720 students in Bhandara Higher Secondary School in which 380 boys and 340 girls.

There are 75 district in Nepal. Among them Chitwan is one of the most famous districts. It is known as heart of the country Nepal. Chitwan district is neighbouring to Makawanpur, Nawalparasi, Dhading and Tanahu district. There are many historical heritages. It is famous for tourism because famous place Saurah and Wildlife Chitwan Natinoal Park belong to Chitwan district. Chitwan district has two municipality, named Bharatpur and Ratnanagar municipality, and 36 VDCs. It's area is 2218 square kilometer.

There are some important rivers like Narayani, Rapti, Rothar, Pampha Khola etc. which irrigated to Chitwan. Also, Chitwan district has other attractive lake like Nanda Bhauju, Bish Hahari and Lami Tal. Chitwan district famous for pilgrimages. Many Hindu people come to see and visit many holy places. So, Dev Ghat Dham, Shiva Ghat, Lav Kush Janmasthan, Bikram Baba Sthan, Chitrasari, Kalika Mandir etc. are most famous holy places of Chitwan district. There are both hilly and flate area in Chitwan. In the hilly area, there is no mother way, electricity and secondary level school. Main crops of Chitwan district is known as paddy, maze and wheat.

## **School Related Factors**

### **(i) Textbook**

The textbook has been crucial role for learning any subject. But the researcher had pointed over the especially the optional mathematics textbook. C.D.C. has made the syllabus and textbook. Private publications have

published different references books. The researcher asked the question about the textbook, to the head teacher, math teacher, students and parents. The received version in their own word as below :

"The government has made syllabus which is satisfactory."

[Head teacher]

"The syllabus is out dated. It should be re-formulated.

"Some How Good.'

[Math teacher]

"Not none about this

" ..... may be ok"

[Parents]

..... Not interested accordingly

..... "not offering in low class"

..... not a practice based

..... only formula.

[Students]

I found that the different voices as out dated syllabus, satisfactory, worthless, not matched, not sufficient, not satisfactory and not unable. From the literature review and theoretical understanding, I found that textbook has crucial role the affecting factor of learning. But the book should be reliable and validity. But according to students view, it is found that they were neglecting the textbook. So the positive attitude towards boys should be carried on.

## **(ii) Peer Group**

Peer group is both a social group and a primary group of students who have similar age , background, interest and behaviors. In other words peer is groups of students in similar types in their age, class, feelings, behavior etc. Does peer group affect the learning is the desirable questions. For this I made questions and asked the same group and noted their respected voices.

- "It has crucial role." [Head teacher]
- "Definitely" [Math teacher]
- "My daughter does not need any others help." [Espe. Ram man spoke]
- "Definitely, It affects." [Parents]
- "It affects"
- "No it does not affect." [Students]

I found that the different voices as crucial role, definitely, affects, does not affect likewise. From them researcher concluded that it has both affects. From the literature review and theoretical understanding, I found that peer group has crucial role. But the peer group should be social, having similar age, background, interest, behaviour and good morale, which I found in my thesis research. But some parents spoke about unsocial behaviour, which should be change according to time.

### (iii) **Teacher competency**

Competency is the talency, ability to do something. Here teacher competency is to compete with knowledge, course and supply the mathematical knowledge among the students. It is the strongest component according to Walberg (1981). Researcher felt about teacher competency to know from the side of head teacher, math teacher, parents and students view. For this he asked the some question and noted as answers in their respected voices.

- ..... "To much"
- ... "First It needs." [Head teacher]
- ... "Yes we accept it."
- "But some where it is not found." [Mathematics teacher]
- "It is important things."
- ..... "Teacher mostly do politics in school." [Parents]

... "Teacher teaches using long method, so it is hard to understand.

[Students]

I found that from the different voices as "too much", needs, important, long method etc. From that research concluded that it is the important aspect. From the literature review and theoretical understanding, I found that teacher competency has crucial role. Which is matched with my findings.

**(iv) Class size**

Class size indicates the number of enrolled students in a classroom. It is the important components. In foreign developed countries has adopted the small class size. But in Nepalese context it is hard to apply. Researcher willing reaches to optimum level to gather the real information from head teacher, math teacher, parents and students level.

For this he raised questions to them and noted as below :

"It is difficult in Nepalese context."

"Government should formulate policy." [Head teacher]

"We have compulsion to teach."

"Very difficult to handle." [Math teacher]

"Unknown about this"

"Country is poor."

"School should manage it." [Parents]

"Sir handles only talent students"

"We were derived." [Students]

I found that from above statement as very necessary, difficult, unknown, difficult to handle etc. From this researcher concluded that it is also very important aspect which affect learning. From the literature review and theoretical understanding, I found that it is the important component. They

advised for limited class size. But in the context of Nepal it is not found. Therefore, I suggested the class size should be limited for effective learning.

**(v) Amount of Homework**

Homework is the such task which makes the students busy at home about their classroom task. They search the materials, read the book, write the answer, solve the problem, ... etc.

It is an important components.

Researcher made question related to this. He noted them as their respected voice.

"Strong correlation"	[Head teacher]
"Strong positive correlation."	[Math teachers]
"To much needs"	
"It needs"	
"It does not need worthless.	[Parents]
"It is only making busy. Not beneficial."	
"Burden for students"	
"It needs."	
	[Students]

I found that from above respected voices "strong correlation", positive correlation, needs, does not need etc. I concluded from above statement it has positive and negative impact on students. From the literature review and theoretical understanding, I found that it plays vital role for learning. I found that some students has been taking it as a worthless but for the betterment, we should give them sufficient class work rather than giving a lot homework.

## Out of School Related Factors

### (vi) Home Environment

Home environment is the such components which describes about the reading room, parents and other education related behaviours. It is crucial component which is directly associated with learning of students. Some parents are educated while other are not. So they could not make the home environment according to will of students. Because they are poor.

I asked the question to head teacher, math teacher, parents and students and noted them as below.

"We can not do all things at school."

We have made hostel for them." [Head teacher]

"They come without home work." [Math teacher]

"We are uneducated. We cannot handle them."

"We are poor. We have single of room."

"If he/she has wills. Nothing stops." [Parents]

"Need separate room."

"Need silence room."

"Father comes late and fight with mother."

"Every time disturbed." [Students]

I found from above statement necessary, need, silent, disturb etc. From this researcher concluded that it has significant role in learning. From the literature review and theoretical understanding, I found that it has a crucial role for affecting learning. Theory advised us home environment should be sound and effective. Which is matched with my findings.

**(vii) Interest of Learner**

Interest is associated with the success and failure of life and achievement. Here interest of learner indicates the willingness of students toward subject, behaving with optional mathematics. Researcher has asked the question and noted them in their respected voices as below :

"It takes crucial role."

" ... But it is important"

"Government should make policy to catch up such components.

[Head teacher]

"It is not as interested as other discipline."

"It is boring"

"Good syllabus."

[Math teacher]

... too much interested, but cannot .....]

"Poor economic background so cannot afford."

[Parents]

"It is boring subject"

"We don't like"

"It should be tied up with the class 7, 8, 9, 10.

"It is too much interesting."

[Students]

I found from the above statement as important, good syllabus, boring, interesting etc. Researcher concluded that it is very important aspect. From the literature review and theoretical understanding, I found that it has a crucial role for learning effectively. Without interest and a will, no learner can learn anything which is matched with my findings.



**(viii) Time schedule**

For the mystery of success and failure. There is "invisible hand" which is directly associated. That important components is time schedule. Researcher feels the important components. He asked the question related to this and noted them in their respected voices.

"They should give proper time for opt mathematics. [Head teacher]

"They should give 3/4 hrs day for optional mathematics. [Math teacher]

"They read only easy subject every time."

"They are found busy in mobile", "face book" ...

"Nowadays environment of learning degrading day by day.

"go to bed 9 o'clock at bed get up at 6 o' clock." [Parents]

"Very difficult so not willing to read."

"Single reading not beneficial's."

"We give 2/3 hrs per day. [Students]

I found from the above statement as beneficials, proper time, to much time, not necessary likewise these voices. I concluded that it has both positive and negative impact. From the literature review and theoretical understanding, I found that it plays vital role in learning activities. Theory suggested us to manage the time while practicing which is matched with my findings.

**School's Policies for Learning Mathematics**

School's policies play great role in the learning process. A critical study of all aspects such as administration, commodity, relations, students' performance, staff's relations etc. and development of operational policies can reduce all the problems that can be observed at school. The following are some of the representative responses of head teacher, math teacher, parents and

students in respective question for school's policies for learning mathematics in the days to come.

"We have started semi-hostel and full hostel facilities at minimum cost for SLC appearing students from this year aiming to 100 percent with the help of teachers. Recently, we have managed one extra math teacher and started extra classes for grade ten." [Head teacher]

"We have sent our children at school for extra classes in time." [Parents]

"I have planned to take internal test at least twice a month." [Math teacher]

"The school has provided extra class in the morning at minimum cost but the number of students are some as previous class, so the school should manage us at least two sections by observing the level of students." [Students]

Especially, the school provided the extra class to support for learning mathematics. So the students are getting happy to pass the SLC exam. For this, the parents are sending their children in time at school and supporting by financially. The above views indicate that a lot of improvements will be done from this year and the process of improvements are still continuing. The result as well as learning of mathematics cannot be no more analyzed due to the beginning of the implementation, but the visions of school are clearly mentioned by head teacher, teacher and parents.

## Chapter - V

### FINDINGS, CONCLUSIONS AND IMPLICATION

#### Chapter Overview

This chapter deals with the major findings of the research and conclusions and implication for further study. The first section reveals the summary, the next sections lists the major findings and conclusions derived on the basis of research analysis and finally presents recommendation for further study.

#### Findings

The following points were observed while conducting this study which are the major findings of the research.

- i. The school had sufficient rooms, desks, benches and play ground with playing materials. The school's library was not sufficient for study materials belonging to mathematics. It was also lacking a library for mathematical materials.
- ii. Academically, the teachers of mathematics were qualified but the teaching style was traditional which was indicating the lack of trainings.
- iii. The mathematics teacher was unable to address for varied cognitive level's students in classroom while teaching.
- iv. The method of evaluating the learning of students at school were only terminal, half yearly and yearly exams. However, the teacher used to give homework's daily but students were facing the problem in delay of checking copies.
- v. The school was trying to reduce problem of mathematics low learning by managing extra classes in the morning.
- vi. The extra class managed by school was not sufficient for students because of large number of students.

- vii. Textbook has the crucial role for effective learning.
- viii. Amount of homework, interest of learner, peer group, home environment could not be addressed in policy levels.
- ix. Teacher competency is issue for government.
- x. The school had a continuous communication gap with guardians.
- xi. The school had vision of the cooperative relationships with guardians but some guardians were found to be active.
- xii. The school management committee of the school had arranged new policies at school to promote the overall learning of students.
- xiii. The new policies were recently organized so effectiveness of the program cannot be more generalized.

## **Conclusions**

Classroom practices and the curriculum are closely linked. Learning of students is always affected by different variables such as school's learning environment, facilities at home and so on. Because of concern about low levels of mathematical learning, new recommendations for classroom practices have emerged over the last decade that have aimed at allowing students to understand mathematics concepts, rather than memories facts. This focus on the learner's role in mathematics understanding began with the development of reforms in mathematics instruction programs that attempted to incorporate new skills of thinking and working in mathematics. These reforms aimed to shift from traditional role practices towards communication of mathematical concepts, collecting information and solving problems, from competitive learning to cooperation, from isolated concepts towards situated or connected learning and application.

Teacher's beliefs about the nature and purpose of mathematics and how students learn have a powerful effect on the practice of teaching. Although the school seems to have sufficient physical infrastructure and qualified teachers

but the teacher seems to be unable to maintain individual differences and promote slow learners in teaching learning activities. Classroom practice was the main cause of low learning in mathematics at school. New policies of school seems to have better educational learning if the total school family cooperate each other and support from own area.

### **Implication**

From the above findings and conclusions, the researchers would like to suggest some implication for the improvement of mathematics learning of the mathematics.

In the context of Nepal, many students have low learning in mathematics and the trend is still continuing. Only the researcher has researched about factors which affect learning . Although qualified, trained and experiences teachers are working at public schools. Continuous assessment system, implementation of operational mechanism and its continuous analysis, a change from syllabus focus to students outcomes as well as a move form teacher directed classrooms to students centered learning is necessary to maintain quality education at school.

This was the case of two schools so the results cannot be generalized an all situations. It is due to lack of time and resources. Thus, similar researches should be done in large schools district wise. Government should researcher about this problem. Government and policies maker should make good mechanisms so that school can adopt to promote mathematics learning.

## REFERENCES

- Baral, K. (2011); *Causes of failure mathematics in SLC examination (A case study of school in Bharatpur)*, Master thesis, Faculty of Education, T.U., Kirtipur.
- Best, J.W. and J.V. Khan (1999); *Research in education* (7<sup>th</sup> ed.), New Delhi : Prentice Hall of India.
- CERID (1998); *Evaluation system in the primary schools of Nepal*, Kathmandu, Nepal.
- Chitwan, District Education Office, *School flash report-I*, 2010 AD.
- EDSC (1997); *National achievement level of grade three students*, Kathmandu, Nepal.
- Ghimire, T.R. (1997); *A study on factors affecting teaching/learning mathematics at secondary level*, M.Ed. Thesis, T.U., Kirtipur, Nepal.
- Giri, G. (2008); *A critical analysis of SLC compulsory mathematics score 2063*, M.Ed. Thesis, T.U., Kirtipur, Nepal.
- Government of Nepal, Office of the Controller of Examination, *Status of SLC results (2045-2067 BS)*.
- Guragai, P. (2001); *A Study of achievement in mathematics of primary level students of Morang and Dhankuta districts*, M.Ed. Thesis, T.U., Kirtipur, Nepal
- Heider, F. (1958); *The psychology of interpersonal relations*, John Wiley & Sons Publications, New York, USA.
- Khanal, P. (2065 BS); *Educational research methodology*, Student's Book & Stationary, Kirtipur.
- Maskey, S.M. (1975); *A comparative study of mathematics achievement of primary school student under different class sizes*, Master thesis, Faculty of Education, T.U., Kirtipur.

- Nath, K. (2007); *A study of causes of failure in optional mathematics in SLC examination*, M.Ed. Thesis, University Campus, T.U., Nepal.
- Neupane, (2001); *A study on the effectiveness of play method in mathematics teaching at primary level*. M.Ed. Thesis, University Campus, T.U., Nepal.
- Pant, B.B. (1978); *Effectiveness of the use unit test results in enhancing pupil achievement in mathematics*, M.Ed. Thesis, TU, Kirtipur, Nepal.
- Pant, Y.R. (2001); *A study of achievement in mathematics at primary level in Doti district*, M. Ed. Thesis, T.U., Nepal.
- Parajuli, D. (2011); *Causes of failure in mathematics in SLC examination in community school (A case study of Dhankuta district)*, Master thesis, Faculty of Education, T.U., Kirtipur.
- Pokhrel, M. (2001); *Mathematics achievement in school leaving certificate examination between public and private students at Kaski district*, Master thesis, Faculty of Education, T.U., Kirtipur.
- Poudel, J.P. (2001); *A study on the effectiveness of class work while teaching geometry at the secondary level*, M. Ed. Thesis, T.U., Nepal.
- Pradhan, J.B. (1999); *Development of standardized achievement test in mathematics for seventh grade students and its implication on their achievement*, M.Ed. Thesis, TU, Kirtipur, Nepal.
- Rahman, M.H. (1981); *Achievement in mathematics by sex : A study of sex differences in achievement in mathematics of seventh grade students in selected schools of Kathmandu Nagar Panchayat area*, M. Ed. Thesis, T.U., Nepal.
- Sharma, K.R. (2001); *A study on the attitude of teachers' guide of mathematics for grade X*, M.Ed. Thesis, TU, Kirtipur, Nepal.
- Shrestha, P.D. (2002); *A study of mathematics achievement of private and regular in SLC mathematics*, M.Ed. Thesis, TU, Kirtipur, Nepal.

- Stephen Lamb and Sue Fullarton Study (2001); *Classroom and school factors affecting mathematics achievement : a comparative study of the US and Australia using TIMSS.*
- Subedi, G.P. (2005); *Factors affecting failure in mathematics in S.L.C. examination study in Chitwan district*, Master thesis, Faculty of Education, T.U., Kirtipur.
- Tuncay Saritas and Omur Akdemir (2009); *Identifying factors affecting the mathematics achievement of students for better instructional design.*
- Yadav, P.K. (2001); *A study on the effectiveness of the primary school teachers of the district of Sirha*, M.Ed. Thesis, TU, Kirtipur, Nepal.
- Yadav, V.K. (2001); *A study on the effectiveness of the primary school teachers of the district of Sirha*, M. Ed. Thesis, T.U., Nepal.



**Appendix- A**  
**Classroom Observation Note**

The classroom observation note prepared on the basis of following indicators being participant with mathematics teacher during teaching learning activities.

**Teacher's Name :**

**Topic :**

**Grade :**

**No. of students :**

1. Physical environment of the classroom.
  
  
  
  
  
  
  
  
  
  
2. Teaching learning activities.
  - i. Beginning of the class
    - ) Creates and maintains a physical setting that promotes learning.
  
  - ii. Setting the stage for learning.
    - ) Communicates objectives appropriately.
    - ) Reviews and relates new learning to previous learning.
    - ) Raises level of interest in the lesson.
  
  - iii. Acquisition of learning
    - ) Combines auditory explanation with visual references and student involvement.
    - ) Checks students' understanding of objectives.
    - ) Uses motivational techniques to maintain interest and involvement of student.
    - ) Provides guided for practice.

- J Encourages relevant discussion.
  - J Utilizes flexible grouping for practices.
  - J Uses a variety of strategies such as discussion, cooperative, peer teaching, project work, class work.
  - J Checks for individual understanding.
  - J Communicates the methods of the increasing the ability of thinking topic, formulae, etc.
  - J Utilizes questioning techniques.
  - J Provides corrective feedback.
  - J Provides independent practice.
- iv. Integration of teaching materials
- J Applies the materials truth.
  - J Sources of the teaching materials: hand-made, local or bought.
  - J Student's attractive materials.
- v. Closure of lesson
- J Relates lesson to objectives.
  - J Allows for student involvement.
  - J Reviews the learning of the day to set the stage for the next learning.
  - J Checks the understanding of students.
  - J Encourage students to reflect on and take responsibility for their learning.
  - J Provides assignments/homework/project work relevant to the learning that has been practiced with guidance.

**Appendix- B**  
**Guidelines for Interviewing Head teacher**

The interview with head teacher took on the basis of following topics.

**Name :**

**Qualification :**

**Teaching Experience :**

) School facilities :

) Classroom management :

) Relation with parents/guardians :

) Opinion towards mathematics learning in classroom :

) Opinion towards low learning in classroom :

) Policies for low learning in classroom :

**Appendix- C**  
**Guidelines for Interviewing Mathematics Teacher**

The interview with mathematics teacher took on the basis of following topics.

**Name :**

**Qualification :**

**Teaching Experience :**

) School facilities :

) Classroom management :

) Relation with staffs and students:

) Relation with parents/guardians of the students.

) Opinion towards mathematics learning in classroom :

) Opinion towards low learning in classroom :

) Policies for low learning in classroom:

**Appendix- D**  
**Guidelines for Interviewing Students**

**Name :**

**Roll No.:**

**Sex :**

**Place of Residence :**

) Opinion on facilities of the school :

) Opinion towards mathematics teaching and learning :

) Opinion towards mathematics learning in classroom:

) Opinion towards mathematics teacher :

) Classroom practice

) Opinion towards causes of low learning in classroom :

) Opinion towards school policy for low learning in classroom:

**Appendix- E**  
**Guidelines for Interviewing Parents/Guardians**

**Name :**

**Sex :**

**Qualification :**

**Occupation :**

**Family Size :**

**Annual Income (Approximately) :**

**Teaching Experience :**

) Opinion towards child's educational learning :

) Activities of the child at home :

) Opinion towards schools facilities and policies :

) Relation among school staffs :

) Role at School :